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FIELD BOOK

364

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JAMES E. KE.

# KEUFFEL & ESSER CO.

DRAWING MATERIALS

AND

SURVEYING INSTRUMENTS.

NEW YORK.

CHICAGO. ST. LOUIS. SAN FRANCISCO. MONTREAL.

## Tables for Excavations and Embankments.

DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

ROADWAY 18 FEET WIDE. SIDE SLOPES 1 TO 1.

FOR SINGLE TRACK EXCAVATION.

" Copyright, 1895, by Keuffel & Esser Co."

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	9.0	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	0
1	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8	10.9	1
2	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9	2
3	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	3
4	13.0	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	4
5	14.0	14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	5
6	15.0	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	6
7	16.0	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	7
8	17.0	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	8
9	18.0	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	9
10	19.0	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8	19.9	10
11	20.0	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	11
12	21.0	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8	21.9	12
13	22.0	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8	22.9	13
14	23.0	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8	23.9	14
15	24.0	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8	24.9	15
16	25.0	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8	25.9	16
17	26.0	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8	26.9	17
18	27.0	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8	27.9	18
19	28.0	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8	28.9	19
20	29.0	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8	29.9	20
21	30.0	30.1	30.2	30.3	30.4	30.5	30.6	30.7	30.8	30.9	21
22	31.0	31.1	31.2	31.3	31.4	31.5	31.6	31.7	31.8	31.9	22
23	32.0	32.1	32.2	32.3	32.4	32.5	32.6	32.7	32.8	32.9	23
24	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	24
25	34.0	34.1	34.2	34.3	34.4	34.5	34.6	34.7	34.8	34.9	25
26	35.0	35.1	35.2	35.3	35.4	35.5	35.6	35.7	35.8	35.9	26
27	36.0	36.1	36.2	36.3	36.4	36.5	36.6	36.7	36.8	36.9	27
28	37.0	37.1	37.2	37.3	37.4	37.5	37.6	37.7	37.8	37.9	28
29	38.0	38.1	38.2	38.3	38.4	38.5	38.6	38.7	38.8	38.9	29
30	39.0	39.1	39.2	39.3	39.4	39.5	39.6	39.7	39.8	39.9	30
31	40.0	40.1	40.2	40.3	40.4	40.5	40.6	40.7	40.8	40.9	31
32	41.0	41.1	41.2	41.3	41.4	41.5	41.6	41.7	41.8	41.9	32
33	42.0	42.1	42.2	42.3	42.4	42.5	42.6	42.7	42.8	42.9	33
34	43.0	43.1	43.2	43.3	43.4	43.5	43.6	43.7	43.8	43.9	34
35	44.0	44.1	44.2	44.3	44.4	44.5	44.6	44.7	44.8	44.9	35
36	45.0	45.1	45.2	45.3	45.4	45.5	45.6	45.7	45.8	45.9	36

Calculated by Julien A. Hall, M. Am. Soc. C. E.

FOR KEITH'S RAILROAD CURVE TABLES SEE END OF BOOK.



# Bird Record of

MR. JAMES W. EIKE  
6207 NEWMAN ROAD  
FAIRFAX, VA.  
22030

9-15-84  
V.S.O.  
These are the oldest records.  
Jim entered Georgetown Univ  
Fall of 1928. Graduated 1932.  
These notes were made in the  
Woodbridge area - most in  
the hamlet's woods (40+ acres)  
the street is now called Armistead<sup>5+</sup>

Clare

2.

16 ga. GUN. MANFD. BY MERIDEN ARMS CO.  
MERIDEN, CT, PATD. JULY 9, 1907.  
NO. ON FORE PLATE 71142

BELOW FIRING PINS -- RIGHT SIDE - 19  
LEFT SIDE - 530 - 71142

22 CAL. <sup>LONG</sup> RIFLE - SINGLE SHOT - GERMAN MAKE  
DEUTSCHE WERKE - WERKE ERFURT.  
RIGHT SIDE - BELOW SIGHT - DRP GERMANY.



MOD  
I

ON TOP OF BARREL

UNDER BARREL 20 GA 5.4 MM  
3541 V

12 CAL. SHORT-REPEATING RIFLE  
MAD. BY WINCHESTER ARMS CO.  
NEW HAVEN, CONN. U.S.A. PATENTED June 26, '88  
DEC. 6, '92 -- MOD. 1906 --

ON SIGHT PAT. JAN. 29, 1906  
ON STOCK - BACK of HAMMER -  
WINCHESTER.  
TRADE MARK.



3.

UNDERBARREL - 4  
23

59

IN FRONT OF TRIGGER GUARD - 2945  
" BACK " " " 29415



FALL 1926 - 16 squirrels  
3 quail

Summer (middle of June to  
end of July)

1928 - My first 17 year locust year.  
Obey, the third of a lifetime! Countless  
(11/28/28) millions of soft, white bugs crawling  
on everything in sight, then just as  
many dry shells everywhere, and  
lastly, that steady, monotonous,  
droning whine, filling the whole universe.  
Whoopie! And what wrecks they made of  
every tree & bush in sight. (Except fruit trees & cacti)

4. 1928

FALL & WINTER - 1927-28 - 68 SQUIRRELS

(MARSH)

MARCH 1928 - RABBIT HAWK - 4 FT. WING  
SPREAD - KILLED AT 83 YDS. 2 FT. - ACTUAL  
measure - 16 ga. gun - Ck max shell -  
no. 4 shot - 2 1/2 dr. - Horner's field

Spring 1928 -

Pair of East. Orioles arrived -  
First in no. of years - nest un-  
discovered - birds constantly in  
& around garden - followed father bird  
on one of many trips to pines at Carl's  
pig-pen - Found one young male & 2  
females - large - were near house for  
next few days, then disappeared -  
Visited once or twice on rainy days -  
Once in late July all 5 returned and  
destroyed 3 large nests of small green  
tent caterpillars in mulb. tree & gooseberry  
bushes - Gone again.

Aug. 12 - 1928 - Killed 8th snake of season,  
6 ft. black - 5 water moccasins - 1 large



5.

8/27/29  
(copper head).

and mooseassin - and 2 six ft. black-  
or "blue racers"

- 1927 Record - 13 snakes - only  
one escaped in maconodgheys  
cove.

- Thus far (until Aug. 8) 4 have  
escaped - one badly crippled.

Indigo Bunting - first observed  
about 3 yrs. ago at Kay's. - nest  
this yr. (1928) on path to road -  
didn't find nest for fear of  
frightening shy bird - daily,  
starting at ft. of hill by dead tree,  
fluttered ahead, chirping, to top  
of hill, where he would fly out into  
the field.

Bunting unseen for about  
2 wks. - reappeared about end  
of July - singing happily.

Children raised & worries of father-  
hood all over, I expect. Good cause to  
be happy!

We have 8 fine chicks which -

hens brot in - 9th. one died, - we  
had decided not to raise any this  
yr. too. Oh well.

Aug. 12 - 2:50 P.M.

Started raining Fri. - 3 O'clock & still  
is - peach tree limb split off - sun-  
flower stalks broken - corn beaten down.

Aug. 18 - Rain - Orioles have come to stay.

Bought Box X-perts - Killed Coopers hawk  
in Castle Woods - about 40 yds. Caught snap-  
ping turtle in mud of marsh. Killed young  
rabbit in garden with 22.

Aug. 19. Almost scored double on 2 hawks  
about 3' apart. Saw one in back crumple,  
& shot first one, he began to fall also,  
then both straightened out & sailed  
away. One first shot fell in Bubb's woods.  
Shot from kitchen door to top of hill.



Sept. 1, 1929 - 1 squirrel

Sept - 1 water snake back under falls  
Total 9 to date.

Total 10

Oct. - (13 or 20) - Killed large black snake on path.

Oct. 22, 1929 - Crippled squirrel in gum tree.  
Habit.

Trapped one hawk on chicken.

Nov. 1. Watched a little sparrow, one  
of several that have been  
singing for some days.

Song: high-pitched, clear tweet  
see, see-e-e, see, see, see  
or shée, shér, shér.

Description: Upper back - red  
brown, like Eng. sparrows.

Stomach - greyish white.

Reddish brown or black  
line on each side of  
a white line thru center  
of head, from bill back  
to neck.

On each cheek is a  
light whitish <sup>yellow</sup> patch, with  
lemon-yellow patches in  
front, deepest yellow near  
the bill, and very pale near  
eyes. White under throat,  
with black, thin line collar  
around throat. Bill short,  
not heavy; thin.

First seen in pine trees  
singing, and today was sitting  
in an oak, from there flew  
down into a pine brush pile,  
and soon up into a small  
pine.

Black line back from eye on  
<sup>(or brown)</sup> each side.

About size of Eng. sparrow.

Plump.

White bar <sup>(or two)</sup> on wings. The  
back is a clear red-brown,  
in most cases not mottled.

↑  
White-throated Sparrow.



About 9 P.M.  
Brooks & many  
here

Nov. 28, 1928. Identified Carolina wrens today. Flocks of them along path to Maconaughey's, in brush piles in woods & in field. These have been living here for years. I've also seen long & short-billed marsh wrens in marsh by pond, and house wren & winter wren are yearly residents. The house wrens have nested here every year since "way back when". There is another set of wrens that frequent Bobb's branch, and who sing beautifully, in a voice out of all proportion to their size, very rich & melodious. These are either Carolina or long-billed marsh wrens.

Another newly-found friend this year is the redstart. He got many a good meal out of the wisterias & the wild-cherry trees in front of the house.

Thought I saw an ~~summer~~ <sup>orchard</sup> oriole this year but not sure. However I saw a summer tanager many times (muchas veces).

I have taken especial notice this year of the large flocks of tree birds, traveling around in the woods. What a system they have! From the little downy woodpecker, down thru all the warblers, nuthatches, creepers, etc. the trees are covered by these bands. Each has his special types of work to do, and they sweep rapidly thru the woods, cleaning out the insects as they go. They have a regular route each time, and return at regular intervals. Many of them were old friends, known or unknown, but many I did not remember seeing before.

One was either a blackpoll warbler or a black & white creeper. He was in a flock I saw in mid-summer, while waiting for a hawk.



Jan. 6, 1929 Went out with dogs on Sat., Dec. 1, 1928; killed rabbit in bed by big dead tree near pond, waited at falls' cross roads while dogs hunted in thickets, then went up road. The puppy soon came out & was trailing around. Teddy picked up the trail & dashed off across the woods, trailing silent. The puppy followed real slow, and I hunted the brush piles. Teddy started barking way off as tho he was barking at a man. I went on over, getting there about 10 min. later. I broke thru the rim of woods into a clearing of small trees. Teddy whined around on his hind legs, barking when he saw me. A big red fox was facing him across a fallen log. When he saw me he darted away, and I flipped up the gun & shot, just as Teddy closed in & jumped on him. He shook

Teddy off and ran away at right angles to my left, loping along. The first shot at about 35 yds. tore the muscle of his st. hind leg. Teddy ran him down just as he was about to pass thru the small trees into the thick bushes. He faced around, about 40 yds. away, his right side to me, his head behind a 6 inch tree, facing Teddy; I pulled the right barrel of the 16 ga. and he flopped over. Teddy sprawled all over him chewing at him, and I reloaded as I ran up to pull Teddy off. His front leg was broken neatly at the upper joint, disabling both right legs. I carried him home and measured him. "Reddy" was four feet long (when stiff), 20 inches high at the front shoulder, and weighed 11 lbs.



altho the scale is usually  
off. His tail was 20" long,  
and over 15" around at the  
largest part. He was a  
perfect specimen, deep  
red, with black nose,  
ears, and legs, and a white  
tip on his dark tail. His ears  
were deep black on the outside,  
and snow-white inside.

When skinning Carl cut  
off the lower parts of his  
legs, but Papa skinned  
I saved them. The fur companies  
quote Red Fox as high as \$40.00,  
Mrs. McKinnon offered to  
pay me more than any fur  
Co. for this or any other fox I  
might get. Mary wants  
him too.

That evening I went  
out & killed another rabbit  
Carl had crippled. Teddy  
ran fine.

Since then I have

killed more rabbits having  
about 10. also have 1 squirrel  
and crippled another who got  
in old gum. I've seen three (3).

For Christmas I received a  
book of Bird, animal, & Insect  
paintings, with descriptions, by  
R. Bruce Horsfall & Clara Horsfall,  
and 13 (or rather 11) nature pictures  
from Peggy; a rabbit picture  
from Peggy (?), a picture <sup>appeal</sup> to the spirit, a book on astronomy,  
a cap, 2 scarves, 1 pr. of socks, 1 tie,  
and 2 prs. of pajamas.

On Sat Dec 29, Mary brought  
my pr. of 8x binoculars (Sumex  
Paris) from Hecht's. I paid \$13.50  
for them, reduced from \$25.00  
I went down to the river and  
watched a flock of chickadees.  
In the pines on the path to the road  
I found a flock of chickadees  
& nuthatches. The nuthatches  
were white-breasted, but seemed



as small as the rose-breasted  
chat.

I've been reading lots of  
animal stories in "American"  
by A. P. Jerhume, & Archibald  
Ruthledge.

1/18/29 - Saw 2 airplanes from Castle Woods.  
1 biplane - C-1276, followed by  
a cabin monoplane, tri-motored,  
with long line of windows.

Watched sharp-shinned hawk.

This was on Jan. 5, 1929. Saturday.

1/19/29 - Saturday -

I was sitting out in the back  
garden this morning, about 10:30,  
listening to the blue-birds &  
starlings singing, and the sparrows  
chirping, and admiring the wonderful  
"late spring" weather, when I heard  
a wild canary sing. I looked around  
and saw not only the little green  
canary, but a bird which appeared to  
be some thrush, or the like description  
fits him. He flew from the fence  
to one of the posts, posing beautifully,

then flew down on between the  
celiac rows (where strawberries  
were) and walked along, a few  
inches behind the canary. I watched  
him thru the birch's arbole,  
until he flew over to the woods.

He was a dark rust-red on his  
back, which had a sort of speckled,  
sandy appearance, not smooth.  
On his cheek was a triangle, cover-  
ing the side of his head, of a lighter  
brown, with the base towards the bill,  
& the apex near the ear. His entire  
chest and under-parts were heavily  
spotted, but distinctly, with rust-red  
splashes, and he had a heart-shaped  
patch of the same color in the middle  
of his chest, over the wish-bone. All  
of the spots were clear cut on his  
light feathers. His only note was  
a sort of chip. He walked very  
alert and sprightly.

← Fox Sparrow - June 13, 1931



Thurs. Jan. 24, 1929. - Had Eng. Arch exam. this morning & came to Sutton Center. I rode over to the work-house with Mr. Hammett on the truck, saw Peggy a minute & walked down the hill. On the last turn above Occoquan I was deluged with acorns, by a number of chickadees, titmice, & nut-hatches & their other friends were perched on the alder trees, but these were the ones that conspired to drop about a quart of dried acorns at once. All of them left the tree but one little fellow who loosened an acorn & followed it to the ground, looping under it several times, then lighting in the road for a second. I just recognized them definitely as old friends, the titmice. This company I saw and was brought them back clearly.

Fri. 25-Jan 1929 - Missed a few in mid-year today, temp. 101° & going up.

Sat. 26 - Stayed inside all day.

Sat. 26-Jan. Saw Sikorksky sea-plane or amphibian this morning before noon. It came directly over the house, very low. The boat body was black, and the skeleton framework appeared very funny. The number was C-12085, I think; I had it written down somewhere. At a dist. only the big boat, the 2 small gondolas, & the 2 small engines appeared plainly, the wings double tail, & the supporting framework being almost invisible. It was the same type as the one in which "Gene" Tunney flew from Frankfurt, over the Hudson to N. Y. City.

Feb. 5, 1929 - Tuesday.

Had Monday off and just got back to school like a 3 day rest. I came home on "3" this evening (4:10), rode as far as Homer's lane with "Bluck" Kaley in "Babi" truck it was up from there near the lower gravel pit (a short ways this side of it) I heard a faint "tzip". I saw a tiny golden-crowned kinglet flying about in the brush, quince & tiny pines alongside the road. He never got more than 2 ft. above the ground. He let me climb up the bank to my chin arm's reach of him, without paying any attention to me. He flew down the road into Sekecan's woods. I followed along the road watching. He then flew up over the high bank into Bubbs' field, stopping by the gravel pit first to let me walk up to get a closer good look, while he waited in a little pine about

2 ft. high. On account of my clatter he could not follow me. He seemed to be all alone, altho I heard him chirping among a large group of sparrows in Bubbs' woods, a few yards away. He seemed only slightly longer than the tiny hummingbird, altho Blanchard says 4 to 4.25 in. It was rather cold but he acted happy & contented, also very much unafraid, even friendly.

March 16, 1929 - Saturday

Today was windy & clear day in the woods. After bringing out the cows I stopped by the gate and watched the birds at work. There were about a dozen flickers, about the same number of yellow-bellied sapsuckers, and about 6 or 8 downy & hairy woodpeckers. One sapsucker went around a young hickory, darting his bill



into each one of the many holes  
he had made. I flew when I  
reached for my headwater to  
stop him from making more  
holes.

March 14 - Sunday.

One expression was in the yard today, humming in the willows, & about trees.

March 23, Saturday -

This was pinch day. Sparrows  
of all sorts, juncos, wild canaries,  
and others of the family were in sight  
everywhere, and all were singing.  
The other birds took a back seat.  
In the marshes by the pond the black  
birds sang and their notes were  
very loud, but the sparrows  
were certainly not very loud.

Wed. 27<sup>th</sup> Feb - went by rail to  
at noon. Camp. Saw lots of  
crows & black birds & sparrows there.  
E. H. Holiday - started today - 10:30 AM.  
7. 4. 1902

Friday 24 - March -

Try to creep down - down the  
 snake by leg over the fork. My  
 hands were all the while  
 interlocked - I held them as  
 I went. I was all the while

Vol. 3. Hatched 1st Feb 1822.  
 The following is a list of the  
 eggs as they were found in the  
 ground. The number of eggs is 22.  
 and the number of birds is 1.

Sun. E. H. ...  
... ..  
... ..  
... ..  
... ..

Sun. ... ..  
Mon. - April - 10th ... ..  
Wednesd.

I have been very much  
 busy lately, and I am  
 not out to the lake for  
 some time. The water  
 is very low, and I  
 am not sure if I can  
 get any fish.

I have been very much  
 busy lately, and I am  
 not out to the lake for  
 some time. The water  
 is very low, and I  
 am not sure if I can  
 get any fish.

2

Pine  
 14th  
 Pine  
 14th

1st

I have been very much  
 busy lately, and I am  
 not out to the lake for  
 some time. The water  
 is very low, and I  
 am not sure if I can  
 get any fish.

I have been very much  
 busy lately, and I am  
 not out to the lake for  
 some time. The water  
 is very low, and I  
 am not sure if I can  
 get any fish.

Pine  
 Warbler

I have been very much  
 busy lately, and I am  
 not out to the lake for  
 some time. The water  
 is very low, and I  
 am not sure if I can  
 get any fish.



2nd  
make

1st 4-11-11

2nd 4-11-11

3rd 4-11-11

4th 4-11-11

5th 4-11-11

6th 4-11-11

7th 4-11-11

8th 4-11-11

9th 4-11-11

10th 4-11-11

11th 4-11-11

12th 4-11-11

13th 4-11-11

14th 4-11-11

15th 4-11-11

16th 4-11-11

17th 4-11-11

18th 4-11-11

19th 4-11-11

20th 4-11-11

21st 4-11-11

22nd 4-11-11

23rd 4-11-11

24th 4-11-11

25th 4-11-11

26th 4-11-11

27th 4-11-11

28th 4-11-11

29th 4-11-11

30th 4-11-11

31st 4-11-11

32nd 4-11-11

33rd 4-11-11

34th 4-11-11

35th 4-11-11

36th 4-11-11

37th 4-11-11

38th 4-11-11

39th 4-11-11

40th 4-11-11

41st 4-11-11

42nd 4-11-11

43rd 4-11-11

44th 4-11-11

45th 4-11-11

46th 4-11-11

47th 4-11-11

48th 4-11-11

49th 4-11-11

50th 4-11-11

Sun. 7 -

2nd bird seen in the morning.  
Held back about the same time.  
He was not  
I got some more birds in the morning  
and put them in the cage.  
A 1st bird seen in the morning.  
at the same time.

2nd bird seen in the morning.  
at the same time.  
The 1st bird seen in the morning.  
at the same time.

Tue. 12 April

about the first bird seen in the morning  
at the same time.

Sat. 13 April

The man was fighting a snake  
Eng. Sparrow along for his life  
yesterday. He was fighting.

to see.

A crowbird (was singing in the top  
of the tree in the morning.  
Singing in unusual place for him. I was  
not sure if its being my old friend.  
His song a call, sounded like "Coo-phewee".  
It was repeated at short intervals.

A 1st bird seen in the morning.  
at the same time.  
The 1st bird seen in the morning.  
at the same time.

2nd bird seen in the morning.  
at the same time.

Sun. 14 April

Got a water snake at falls, about  
2 1/2 ft. long. One bullet thru the very  
center of his head.

2nd  
snake

Sat. 20 April

Got a 5 ft. black snake on the  
near side. One bullet missed him.

4th  
snake



and saw that they were  
about 2 in. from his head.

Just like long-eared  
whistlers in behavior  
Nashville  
Warbler  
4/20/20

Sun. 21 April

Went out about 12:15 got  
back at 3:30

The woods were full of  
birds. The first thing I saw was a  
little bird in the hawthorn and  
sage pines. He had a small head,  
blue back, and a yellow  
underbody. He was very  
small. The bird was yellow  
underbody. He seemed to  
come in from the hawthorn.

Next I saw white throats &  
some white-crowns. There  
about several hundred. No one  
would be in sight on the ground,  
but they were in the trees. I noticed  
their song, and saw some  
red in. There is one of the  
most beautiful tapping

songs I have ever heard, short,  
tho it is. Every bird color on the  
throat was clearly and brightly defined.

There were also a dozen or more  
around me. One was a pale brown  
all over, with much gray on the  
sides. He resembled the white-eyed  
thrush (towns) in the museum.

I saw several black & white  
cragg warblers. Every black  
stripe was jet black & shining,  
and every white one was snow-  
white. The contrasting clear-cut  
lines make me regard him as  
one of the most beautiful birds  
I have ever seen. His black legs  
& long black bill harmonize with  
the rest of his costume. His small  
little song is very charming.

Another bird I first classified  
as a white-bellied nighthawk but later  
decided he resembled the description of  
the least flycatcher in the  
flycatcher. He seemed more to be  
a warbler however. The least

(Quail in the museum seemed  
very much like this bird.)

Next I saw what may  
have been a summer tanager  
in a pine tree. He was quite  
pink all over his body, with dark  
red head and tail and brownish  
wash on the wings. His tail didn't  
seem as long as that of the tanager  
in the museum, and his bill was  
not so much brown as some of the  
pink finches. Within a while he  
threw a crossbill. His wings  
were dark red like his head.

I considered the purple bird but  
was not sure of this either. He kept  
calling, see-e-e-e-e. He looked  
about twice the size of a sparrow.

I saw a myrtle warbler also,  
in fact, several of them. He had  
a gold. rump and sides, deep blue  
head, whitest throat and back to back with  
light blue. Each wing had two  
distinct white bands.

Above the pond I saw a third bird,  
like the alluvial-backed, but I  
couldn't tell for sure. I kept watching. [5th  
colony 1900 stacked his body. I got a pallet of his chin & out his body  
April 27 - Sat. a little one (2 ft) got away.]

Saw the first scarlet tanager  
Thursday 23, in the young apple tree.  
Also saw the first bee-eater  
that evening about 6:15. He was  
in the apple tree, calling to let me  
know he was back.

I saw the bee-eater again  
today, and also a tanager in the  
woods.

In the yard there is a beautiful  
little chaffinch and bird. His entire  
body is clear bright gold, the wings  
a little darker, and a number  
of short stripes down the upper breast.  
His song is with a note, with a note, with a note,  
not too frequent in time.

I think he is the "Yellow  
Warbler", the Summer Yellowbird.

I saw a Myrtle warbler  
(in a cypress tree, I think). I identified

Yellow  
Warbler  
4/20/00



here today.

Another little bird, very  
"cheery, cheery, cheery", or "vee-ay-ay-ay".  
We used to call it "the song" "Mary".  
It is a gold, somewhat dark, with dark  
tail and white under body. The  
head, breast & back are  
gold & yellow-throated vireo? A.K. - 7/29/50

In the oak tree I saw a  
warbler with olive back, gold  
clumps, & thin gold spot in the  
center of crown. I could not see  
his body very well, but it seemed  
whitish yellow or gray with faint  
streaks. However, he may have been  
a myrtle warbler. A.K. - 7/29/50

On the way to the river about  
11:45 A.M. I heard a pretty song and looked  
into the woods by the road side. There  
was a pair of Redstarts, when I  
became acquainted with last year  
in our front yard. There are the  
first of the year.

A little farther a bee-eater was  
sitting on the electric light wire over  
the road. Still farther, near  
Smith's new house, I saw a  
Maryland yellowthroat, the first  
of the year.

A few months ago I found  
the beautifully built nest of  
the oriole, in the arbutus at W. M. Lane's  
fence, where the chimney is.

Saw 3 hawklets today, but no  
snakes.

A wood thrush was sitting on the  
ground near the pond. He flew from me when  
I approached & was, finally, completely.

7/29

1 warbler. Back - olive green, upper  
parts & sides. Head & throat with  
black. Long, loudly & continually I walked  
along the hill path. Another answered  
him from the bottom hill. King - fantail (2/2/51)  
or Blackpoll.

1 warbler - olive green back, wings  
& tail. Bright orange under parts - sides



of breast heavily streaked with  
black or old-brown. Sang  
constantly - "Zhe-zhe, zhe-zhe  
zhe". Had light brownish line thru  
eye & curved brown line under eye  
like inverted pickles. Long & slim,  
standing out. Was seen good &  
in trees. Prairie Warbler (5/8/29)

1 pr. Maryland Yellowthroat in  
bushy oak stream behind hill  
by the house

6 or 8 Catbirds in swamp near  
road. (In field.)

1 warbler near yellowthroats

7 Worm-eating  
warbler? olive-green back, gray underparts,  
faint yellow wash on breast-plump.  
Kept near ground in small bushes. (at 9:00 a.m. 5/3/29)

Several Chewinks - some in trees.

One warbler on fence post - this way  
till, low. Eating caterpillars on a limb.

Blue jays back, slaty crown, slightly  
heavy bill (i.e. didn't taper out sharply)

Seemed to have tiny barbs on bill. Also  
seemed to have barbs at base of bill.

Wilson's or Red-winged Warbler? (or the)

Tennessee Warbler (?) 7/27/30

Saw several more this year  
going north in flocks, some at  
last. About 50 in one group  
group. They lit in the woods by the house.  
Always or so stay here all year.

May 4, Sat.

Heard a yellow-billed cuckoo  
this A.M. about 7:00. Will be welcome.

The tent caterpillars are on everything.

Killed a water-snake at 10:00,  
about 2:15 or 2:30. The shot almost  
scared two muskrats to death. They  
dived into their underwater lairs  
like skates, going under the bank.

Another water snake got away.  
All the meadow larks, and the swifts  
also, are here now.

A bluebird has a nest in  
Mrs. Metzger's Starling box.

A Catbird has a nest in a pine  
about 4 ft. from the ground, on the path  
to the pond. There were 3 eggs, white,

heavily spotted with chocolate.

Jan May 5.

Two other birds of the same  
kind as the previous one. These warblers had Gold sides,  
sides and backs, legs blackish  
green and black. One was black with  
white base. Long black throat &  
breast, also had white underneath  
underparts. Black-throated green  
warblers.

Saw dozens of myrtle warblers.  
Flycatcher - size of robin - yellow  
underparts - above green back - call  
"quint-quint" very loud. Was first  
I will describe it to you. It was  
first heard in. Great Crested  
Flycatcher. Found to be the same.

Warbler - olive green back, orange  
yellow throat & upper breast - black line  
under throat - dark head - white  
underparts - Kentucky Blue Grass (7)  
Warbler.

4/20/30

One under the the myrtle  
but:

Had black streaks instead of  
solid black breast & sides. Yellow  
spot on sides, crown & nape. White  
throat, clearly defined by black  
stripe at bottom. Skin. The  
stripes puzzle me. Must be myrtle.

Perhaps whole - 7/29/30

4/20/30.

One water bird at pond. Sandy  
yellow & salt, black back & head  
white underneath. Long bill. Pink  
or black legs. "Da da da" when  
disturbed. Lesser Sandpiper - 5/2/30

The bird I before called a Longish  
water bird - was in lake in marsh  
singing sweetly.

Several pairs of the pond  
yellowthroats were in marsh at  
pond.

One or two male scarlet tanagers  
at pond.  
Many wood thrushes. One of



- (Guns) fused much over a long time.  
"Pit, pit, pit!"

7th. I killed my 9th. water snake  
in the pond. I saw his body in water,  
by using binoculars. Finally saw him  
or so of nose showing from behind a  
blade of water grass. The bullet went  
in back of his eye, killing him like  
a knife.

Watched a muskrat carry  
the grass roots to his home under  
the bank. Another came in without  
a load. They went in & out, &  
finally one came out & swam  
all over the pond, under water.  
After two or three minutes he came  
back with a big bunch, I think.  
I stood over the dead spot 10 ft. from  
them. When they swam on top big drops  
of water hid in the fur.

May 7 - Tuesday.  
Heard oniale for first time,  
this A.M., about 6:00.

Found yellow-bellied Cuckoo  
dead in garden by stable this A.M.  
Feathers in front of chicken house  
showed that something probably  
caught him in the place where there.  
We needed him badly too, as  
the coffee thrush are on everything.

Wednesday, May 8, 1924.

Saw oniale this evening on  
the clothes line 5:00 P.M. He  
pulled a shoulder strap of some  
kind of something. He was a she,  
however. I hung up 5 pieces of  
string to help with his work.  
The grass was in the chicken  
over the chicken house. Also  
a male orchard oniale. The  
female flew before I could  
shoot at her. He was black  
above & on wings. I heard, that

red nest-brown below. He was  
singing in the cherry tree & walnut  
tree.

The scumme tanagers I was  
singing in the big wild cherry tree  
the evening. He was purplish-red  
above, with darker red head  
rump. He is the same bird I  
saw in the pines April 21. I also  
saw what seemed to be a night  
warbler in the garden, swimming the  
ground & then in the locust tree. He  
looked the same as the bird that  
puzzled me down May 5.

A yellow-bellied cuckoo was  
crying on a pillar in the locust  
tree. The orioles were busy at their  
I feel better writing the friends.  
A flock of myrtle warblers were  
on the lot.

May 9, Thursday.

About 2 dozen <sup>woodpeckers</sup> in pines were  
to read. They were a little larger  
than my experience, but rather large.

[Veeries  
July 12, 1903]

They were red brown on the back,  
buffy gray underneath. Harder  
buff wash on throat. Eyes big and  
dark.

Pair of little warblers at Snyder's.  
They flashed into the pines & I  
could not get a look at them but  
they seemed Maryland Yellow-throats.  
Pair of yellow Warblers at Flings.

Many black warblers were  
in the trees around the pond. The  
head, back, crown, throat & upper  
breast were jet, shiny black. In  
some lights the head & upper back  
appeared very deep, dark blue. A  
conspicuous, somewhat egg-shaped  
white spot was on the wing. The under-  
parts, beneath the black belt, were  
snow white. "Gee-gee-gee-wee, wee,  
weet," a sweet song, was constantly  
repeated by many little throats.  
They hunted diligently, their thin  
supercilious raised like in the  
bush. The description of the



Back seemed darker - like  
Carina warbler - 7/29/30 - This year back  
looked lighter than last - better wearing and probably.

Black-throated Blue Warbler  
fits him imperfectly.

There were many Black-  
throated green Warblers at the pond  
also. They are beautiful.

There was another little  
warbler with olive-green back,  
slaty head - gray-white under body  
white. White light on lower back.

Vireo?  
4/20/30

Tennessee Warbler - 7/29/30

There was another warbler in  
the tall bushes - orange-yellow  
head & neck, olive-green wings -  
yellow back & stomach. Prothonotary Warbler?  
4/20/30 - 7/29/30

Several warblers - olive-green back,  
yellow underparts. Black. Black. Black. Black.  
& much & up under bill & on the chin. Indeed  
bright yellow circle on cheek about eye.  
Hooded Warbler.

Some tiny warblers - olive-green  
or dusky wings & back. Orange-yellow  
on rump back, between wings & tail.

head, yellow - up to eye on upper part.  
Parula warbler?

4/20/30

Several warblers at pond.

Several pairs of warblers -  
black & white striped on top &  
checkered. Orange black line over  
eyes & white line under eye. White  
underbody - black & white striped  
between legs & back of legs.  
Black legs & feet. Black-yellow W.  
9/20/30

May 11, Saturday.

Killed spotted-head meadow  
8th. about 1 ft. long on road back of  
new sand. Stopped about 3 ft. from  
me & spread. Its neck about 1 in. wide  
and about two inches in length. Hog-Nose snake

9th.  
4/10th.  
Snake

Killed two six-foot black snakes  
with white stripes, under bush  
in Bubbe's field. One had the  
skin off its back in several  
(5 or 6) places, as though it had

These snakes look exactly  
like the ones of "Chain snakes" in  
the museum, & were lying just  
like them, also, & seemed to be  
snakes.

been buried.  
Saw what was a female  
Blackburnian Warbler, more likely  
Redstart.

Several several  
Redstarts.

Walked up to within 3 ft.  
of brown thrasher's nest in a  
bush, before I saw her. She  
didn't move as I turned away.

Saw one male & two females  
Cowbirds walking & pecking around  
nest of cowbird house in field.

May 12, Saturday. Sunday.

Several warblers - Slate-blue  
head & back. Red-yellow shoulders,  
(between wings). Yellow rectangle on  
throat, bordered on all sides by slate.  
Narrow slate line below yellow throat  
then yellow breast, with red-brown  
center. Underneath white.

Parula Warbler.

Saw a number of Redstarts.

Quite a few of what seemed  
to be Blackpoll warblers.

Black crown & sides of head  
to bottom of eyes. Broad white  
line under eyes. Black stripe  
from bill down neck on each side.  
White center of breast & upper  
body. Black rusty back & white  
streaks. Twisted as walked along  
limb.

In the marsh I saw a  
number of little warblers looking  
like cowbirds, except for long, slender  
bill. Two white outer tail feathers  
conspicuous in flight - white lower  
stomach. Tail constantly snapping  
& used for balancing when alighting  
on limb, or reach out for  
worm & insects. They were usually  
above stream into pond, by way hills.  
Saw many more. Blue-gray  
Gnatcatcher.

Beside the road to "Ed Williams"  
place I got a pheasant which had



been scratching on sunny hillside.

In reading over the descriptions of various warblers, I recognize the "Blue-winged", Chestnut-sided, "Magnolia", & <sup>(6:10)</sup> ~~King~~ warblers as among those I have seen this spring.

O.K. Have also seen welcome Thrush, or Blue, and the Hermit Thrush. Among the other small thrushes I have seen have probably been the Alice's, Olive-backed, & the Water thrushes, but I haven't been able to identify them definitely.

The tulip trees are bursting now, & in them I saw a large flock of Cherry birds. They are in the middle of eating now (6:15 PM.) eating them before they get red.

May 25, 1929 - Sat.

Ruby-throated humming birds have been here about 3 wks.

The fireflies arrived about 2 wks.

May 26, 1929  
10th day  
with  
mud

Killed 2 snakes today. One water snake about 2 1/2 ft. long at pond, the one that got away from "before", and a water snake about 6 ft. long on Bubbe's branch.

Dozens of Goldfinches in marsh today. They were all singing at one time, but several redstarts, and several Blackpoll warblers.

Mon, May 28, 1929

Saw dozens of little warblers or flycatchers this evening. They were all over Bubbe's field & in the pines. They were dusky olive-gr. or yellow on the back, & lighter grayish yellow on their breasts. Several white outer tail feathers showed in flight. They flew along darting in every

direction, snapping their bills repeatedly as they snapped up insects. In the trees they picked at insects like warblers & darted after bugs. Female Prairie Warbler? - 5/9/30.

Out in the field were many warblers, bright yellow underneath, heavily streaked on the sides & neck with bright black, with a black spot back of & below the eye. They sang constantly "witt witt witt, wee wee wee". - Prairie Warblers - 5/11/30

Tues. June 4, 1929.

Holiday today. School closes tomorrow. Killed 2 snakes. One 3 ft. water snake in marsh above pond, and a black snake over 6 ft. long on the branch running from the "Cattle Woods" thru Bulb's woods.

Have seen many blackpoll warblers around the pond. Seems as tho they intend to stay all summer. I see pairs of Maryland Yellow-

throats every where I go. They are rather tame.

June 15, Sat. I saw two of our gayest & most cheerful citizens shamelessly making love today at the pond.

Mr. Chick A. Dec was dancing around Mrs. "Chick", fluttering his wings so rapidly they could scarcely be seen. He was whistling rapidly "dee dee dee dee".

I saw three plump youngsters of theirs in a pine at the pond, some weeks ago. There may have been more than three but that was all I could see in the thick pine. That is, all I could see at one time.

June 22, 1929 - Sunday.

The second brood of young wrens is about to leave the nest in the pear tree. This half of a gallon oil can has to its credit 2 or 3 broods last year and two so far this year. The first or second brood is ready to leave the tomato



can hanging from a low limb  
in the small plum tree by the  
back porch.

The second brood of young  
robins has left the nest in the  
top of the locust tree.

A sparrow nest in the top  
of the pear tree by Peggy's flower  
garden.

I located another robin's  
nest in a small cedar tree on  
the lot today, using the binoculars.

I found a catbird's nest in  
a little dogwood tree on the  
banks of the Crab-pond, the other  
evening, & at the same time  
located the summer tanager's  
nest in a little cedar, about  
8 ft. from the ground. The bird  
is on the bank on this side, next to  
Carl's house, opposite the catbird.

A wood thrush had a nest  
in a little oak over the path to  
Ed Williams. It has been vacant for  
some weeks, & now it's gone.

The wind blew it away, perhaps.  
There is another nest somewhere  
near that one, as I see the wood  
thrush flying back and forth  
there with food. There are perhaps  
six or eight young thrushes flying  
around in a bunch. Two broods  
joined I guess.

The Baltimore Orioles have  
only showed up once or twice  
on rainy days. The Orchard  
Oriole is seldom out of sight  
for more than a few minutes  
at a time. He is singing constantly  
in the top of some of the trees  
around the house. His favorite  
tree is the apple tree in front  
of the chicken house, with the  
cherry tree, wild cherry trees &  
walnut tree, ranking about equal  
next to that.

I have not been able to find  
either of the orioles' nests.

I had lots of fun last week in  
Alexandria, watching the scoutmaster

of the Eagle patrol playing with  
their 30 live snakes. They had  
one mountain rattlesnake and one  
mounted copperhead, but no other  
poisonous snakes. They also had  
a horned toad, a pair of fence  
lizards, 3 Japanese rats, etc. The  
pilot black snake struck the  
scent master five times while he  
was teasing it. There were five little  
drops of blood showing around on  
his head. Sort of "X" marks the spot  
affair. The S.M. is connected with  
the Wash. zoo or museum, I don't  
remember which.

The nested named above are  
only a few of those I have found  
this year, and only a very few of  
those present on our place.

Speaking of sardines, I saw  
five young Whitebills raised in a  
shallow woodpecker hole in large old  
pine stump, growing as a fence post  
in the fence below the oak tree.

When I first saw them they

had only a few pinfeathers, &  
things were not so bad. Later  
they were fully clothed and  
ready to leave the nest, and  
conditions were crowded. I  
stroked their heads and they  
huddled down as low as possible.  
Two days later mamma &  
I looked for them, but they were  
gone. While I was getting  
them that day the parents  
sat nearby but didn't seem to  
mind me.

June 26, Sunday.

Last Sunday evening I went down on the  
lot & found 5 empty chip-sparrow nests  
from this spring, and another one with  
2 young Chippies. There were 3 young  
robins in the nest in the cedar.

There is a nest of bee-martins  
in the top of the hyssop tree in front  
of Carl's garage. They are about ready  
to leave. It is almost invisible, being  
hidden in a thick leaf-clump, & a hole



with about 15 apples hangs right down over the nest.

There is another wren nest in the tomato can on the corner fence part of the garden.

I saw one little mockingbird the other day in the yard. He had just left the nest, in the second cedar from the black cherry tree.

The corner oak, over the old cellar has a robin(?) nest in almost exactly the same spot as the oriole nest was last year. A little way down in the woods is a robin or wood thrush nest high up in a fork against the side of a black oak. I found these when the robins, catbirds, & wood thrushes were fussing about something back of the chicken house, & so there were no birds on the nests to identify them.

I killed two young rats & 3 mice with 22 shot shells this morning there was at least a dozen of them in one nest under the floor back of

the tool house.

I just remembered that on June 15, when I saw the loving chickadee, I also saw several Hooded warblers, either immature or females, as they had only small heads. They sang gaily & constantly. I also saw a number of blackpolls and some Maryland yellowthroats. One of these, a beautifully colored male, sat on a post in the garden yesterday & sang for a few minutes.

The young summer tanager has left his nest in the cedar. The Baltimore Orioles have been here for several days, eating the plums on the trees.

The Orchard Oriole has not been seen for a few days.

<sup>15th.</sup> I killed a ribbon-snake or water snake about 2 ft. long on a tree limb about over the 3rd. Culvert from Horns Baber's place.

July 2. Tuesday - Went down to

16th. water snake at culvert at bottom  
of Hambaker's hill.  
Killed 5 or 6 ft. black snake inside  
Bubbe's place by bare.

July 3<sup>rd</sup> 4<sup>th</sup>.

Put big Diamond-back terrapin  
in pond. Carl caught him Sunday  
in stream below Withers on  
old road. We were coming back  
from Peabody-Dumfries ball  
game at Bobb's store. "Dip" was  
about 15 in. long & about 10 wide.

18th  
snake  
X

Forgot to mention this snake  
in proper place. Should have been  
16th. I was going to Westbridge  
at 3 o'clock when I heard the  
birds fussing in Bubbe's woods  
back of the culvert. There were  
about 2 dozen robins, six or eight  
catbirds, about 4 cardinals, some  
wrens, & the pair of Indigo Buntings  
the first time I have seen them  
this year. One pair of robins

especially, would light on  
a little open clump of briars,  
and leap in & back out quickly.  
I went thru the fence & briars  
saw a big black snake, fully  
6 ft. long. He still had about 6 in.  
of his tail hung over a limb  
2 or 3 ft. from the ground.  
The lower part of his body was  
coiled up tightly, and he had his  
head buried under the wing of a  
baby robin he had just gotten  
out of the bush. I could find  
only a stick about 3 ft. long  
& 2 in. thick, very heavy. I  
jabbed in thru the bushes,  
striking his head several times.  
He thrashed about for a time,  
& suddenly darted out for the  
thick bushes. I drove his head  
about 3 in. in the mud & took  
the young robin from under the  
bush, placing him on a limb. The  
parents searched on the ground for  
him, fussed around the snake,



undecided whether he was dead or not, & were still busy when I left, 15 min. later. I felt so sorry for them, calling & screaming constantly.

I have since seen the Indigo Buntings near the house. They appeared ready to build in a pine, some days ago, on the path near where they nested last year.

Last week I saw several pairs of redstarts, in the pines at Dago hill, fussing about something. A bunch of weeds & catbirds were with them.

Haven't seen or heard anything of the Orchard Oriole for a week or more now. Blanchard says his song ends early in July.

The female White-throated Oriole has been here at all times of the day, lately, eating the plums.

I think a Scarlet Tanager has his nest in the big willow oak at the bottom of the hill.

19th. snake

July 8, 1929. Monday.

Killed 3 ft. Watersnake at falls today. He had many small rings around his body, resembling a Cornsnake. He swam weakly down stream with part of his "insides" out. I wanted to kill him outright but he disappeared a few yards from where I shot him.

Saw a black & white creeper on a tree in McManis woods, back of the old cellar this evening. I was going to Wood Budget & hadn't time to watch him. He seemed to be alone, but happy. I followed him around a black oak, whence he flew to a white oak, & then flew up among the limbs where I couldn't see him.

Found dead muskrat at pond today. "Sliders" / "snappers" were trying to eat him. Just his nose was in the water. Saw a live muskrat swimming home. Saw 3 new squirrel nests.

Watched beautiful mallow  
screen at about 9:15 AM  
caught him & kept him  
for a while, then turned  
him loose. (Or her more  
likely).

Thursday, July 11, 1929

Mamma went to Wash. This  
morning. Aunt went to Oregon  
& asked me to meet her at the road  
at 2 o'clock. While waiting there I killed  
<sup>20th & 21st snakes</sup> a ribbon snake about 1½ ft. long,  
in stream, and a young copperhead  
in the stream a little farther up. A  
large water snake got back under the  
little falls. I missed his head later  
when he poked it out. I tore the place  
up but ~~have~~ couldn't find him. Have  
seen him several times since.

Saturday, July 13, 1929.

Killed 3 ft. Copperhead on  
pile of brush over stream in Cotte  
snake. Wabbs. One bullet thru head,  
just inside right eye.

Saw prairie warbler on path  
just over hill this evening. It  
let me get within a few feet  
of him several times & I got a good  
look at him. His head, neck,  
throat, & stomach were clear  
yellow, the throat & stomach  
heavily streaked with black.  
I got a good look at the chestnut  
spots between his shoulders.  
His wings, back, & tail were olive  
green. He sang as he hunted.

Sunday, July 14, 1929

Went after snake at road about  
11:30 A.M. Saw Great Crested  
Flycatcher on dead tree behind  
old cellar, yipping to his mate  
who was there also. Saw some  
Blue-Gray Gnatcatchers high  
up in pines by stream near road.  
Went over to mason in middle  
of Cotte's field. Saw what  
must have been a yellow-  
Breasted Chat there. I heard



him fussing and squeaked up  
to within 2 ft of him. He sat  
there in a magnolia tree, watching  
me, and fussing. His head,  
neck, back, wings, and tail were  
brownish or dark olive green. His  
throat and breast down to his  
legs were bright clear yellow,  
darkest on the throat. From his  
legs back his body was white.  
His bill was black and some-  
what heavy, and seemed to  
resemble a shrike's very  
much, even to the hook. His  
legs were dark gray.

His body didn't move the  
whole time, except his head and  
throat as he tilted them somewhat  
to scold. His throat would swell  
and the harsh "chirp, chirp," at  
intervals, had a twang as though  
coming from a stringed instru-  
ment, *doe banjo*. Once he sang  
a pretty little song. I watched  
him a long time, noting

around into the bushes in  
back of him, while he sat there  
fussing. A little Maryland  
Yellowthroat (female) hopped  
around in the bushes below him.  
Later he was flying along in the  
bushes near me and scolding,  
and his wings & tail (which was  
pumped up & down as he flew)  
made a loud, heavy, slapping  
sound. This may have been  
another bird instead of the  
same one, the mate possibly.  
I forgot to mention a broad  
white line over his eye from  
bill to throat, & a tiny white eye-  
ring.

While following a narrow  
path through high dense walls of  
brars, alders, magnolias,  
sassafras & willows, a little  
bird fluttered in bushes about  
2 ft. from my head. It looked  
like a baby black & white  
creeping warbler, but it

hunted in the bushes a few feet from me, like an old bird, hanging upside down, flitting, moving along limbs, etc.

His feathers were raggy and pale like a young bird not yet fully clothed only the outer tail feathers were present. After awhile he passed out of sight in the dense briars a few feet away.

I climbed the huge maple tree and stayed a long time. A mourning dove lit about 10 ft. away in the other part of this double tree, and after awhile cooed a bit, her voice sounding as low as it would sound at a great distance. After about 10 min. she flew.

I saw a number of Carolina wrens in the marsh here, as on the path to the road. They just appeared in the last week. They are here every year in these two places,

as well as ~~at~~ the pond.

There is a big hollow back of the hill behind our house. Thru this hollow a stream runs and down thru Bulls place, to marsh I was in this morning. On the stream I saw a bird which must have been a female chewink, but didn't exactly resemble any I ever saw. The bird was scratching like a chewink, in the leaves back in a dark nook under briars & bushes. Its back was brown with a reddish-chestnut wash on back of the head & neck. There were a number of white streaks running lengthwise of the wings, and white outer tail feathers, making the birds lower back seem streaked with white.

A little farther up, nearer the house, I saw a little Maryland Yellowthroat singing. They have

speckled  
breast  
buff-  
grey.



nest near here I think, where  
the road cuts thru the hollow.

X The bird that seemed a  
Chewink had its breast ~~whitish~~  
speckled with light grayish-buff  
streaks, like the upper parts of  
exclamation points. They ran  
straight up & down. The breast  
was pale grayish-buff.

Wed. July 24, 1929

Played ball Monday for the  
first time in 6 or 7 weeks since  
(June 14). Played Tuesday. Wed. we  
went over to Fench's run with  
Oscar, having game to the school  
ground for J.P. Davis. Got back 4:30.

23rd. Bubby and I went out on bridge  
with branchcutters. Saw a first  
water snake at foot of the first  
~~water~~ <sup>Pier</sup> ~~cut~~ <sup>that</sup> in the water on this side.  
after a few shots he slid under  
a log. Then a foot long snake  
swam out. We shot at him

for 5 min. I came within  
6 in. of him once, & Bubby  
came within about 3 in. of him.  
He was straight under us and the  
shooting was done in a very  
cramped fashion. Finally I got  
in a little better position, and  
the ~~second~~ first rock whacked  
him on the head. He turned  
over on his back, and laid  
motionless for awhile, finally  
floating out with the tide, stone  
dead. Saw a dozen large "sliders".

Thursday, July 26, 1929.

Played ball today. Geo. Macmahon  
& Oscar were there, also Bob McCullum.  
Dumfries wrote that they couldn't  
play Monday Sat., but would  
Monday.

Bubby & I went out on bridge  
saw one large & one small snake.  
we nicked both several times.

X Saw an Indigo bunting (male)  
singing on the spire by the bridge  
Wednesday & today.

Babbs started tracking today.

Sunday, July 29, 1929. (Killed at home)

Saw white crane at pond.

He certainly was beautiful.

24th

make

Killed black snake on stream from Castle wood.

He was velvety black, about 5 ft. long. That I saw 2,

but the one that went under the bank may have slid up to the top, under the bushes, where I killed it.

Tuesday, July 30, 1929.

Went down the stream back of Mr. Alling's paint shop, with

25th

snake.

"Bobby". Saw dozens of birds of all kinds along the shore.

On the way back I killed a 2 1/2 ft. water snake in a pool back of the work shop.

This was a green looking snake, having light rings around its body, not like

an ordinary water snake.

Went to Woodbridge this morning to get egg crate. Pitched horseshoes, Harry Sundette and I, "Bobby" & "Shorty" & Harold pitching by himself. Harry & I won 3 out of 5 games.

"Bob" & "Dutch" McMahon came down. "Bob" MacCallum, "Billy" Sanford and I, stood "Bobby"; Harold Sanford, and George Mac Mahan. Clyde Beard played first base for both sides. "Bobby", "Silly" & I won, 4 to 2.

George broke bats, intent idly on an inside ball pitched. I hit one over the washed & so did George.

Many stars in vacation this evening.

August 23, 1929, Sunday, Sept.

Lazy lately, haven't been keeping my traps. A female Orchard Quail has been



taking the last of the red  
grapes from the cedar trees  
to now from the vines outside  
the window. I got within 3 ft.  
of her this eve. I haven't  
seen the male since late  
in July, when I saw one on  
the Wood ~~B~~ ridge school  
ground, & before down at  
Kate Crabber's, this side of  
Wittner's. I wonder where  
he is, and the children, if any.

The female Balt. Oriole  
appeared some time ago  
during a rain, as last year,  
but later she has been around  
a lot, in the middle of this long  
dry spell, which started  
early in ~~Aug~~ July, broken  
only twice by a little rain.  
No male or children here  
either, as yet.

Have seen the flocks  
of woods "white wings" many  
times lately; the downy wood-

peckers, nutcrackers, chick-  
adees, black & white creepers,  
vireos, etc. I have not yet  
noted a brown creeper among  
them, but they are very  
inconspicuous anyway, & I  
haven't watched closely.

On way home from  
Wood Bridge this eve (about 5:35 or 5:40)  
I saw about a dozen little  
pine warblers. They were  
smaugly, dusky <sup>(of gr.)</sup> yellow on the  
back, and lighter underneath. The  
wings & tail were at. green, with  
the white outer tail feathers  
very conspicuous, especially  
when flying from limb to limb  
or darting after insects, like  
flycatchers, when the tail was  
spread. They were in the large  
Junos & small shrubs along the  
path near the big willow oak,  
on the way to the road.

I saw a large ~~downy~~ hairy  
woodpecker in the dead

tree in Selkman's woods, near  
the road into the woods.

I saw another hairy in  
a dead tree in Mac Mahan's  
back of the house. Both  
of these were seen in early  
August.

### Special Note: —

During the summer  
2 or 3 yrs. ago, Peggy  
& I were going to Ocean  
we went thru Mac Mahan's.  
In the middle of the road between  
the small pines, just after  
we came out of the pines  
near Evelyn's we found  
a large squirrel (grey) dead.  
Its jaws were firmly  
clamped over the neck,  
several inches back of the  
head, of a large black snake.  
The snake was about  
5 ft. long. The grey squirrel  
was somewhat swollen.


Seems as tho' the grey squirrel  
killed the snake by crushing  
its back-bone but got its medicine  
in the meantime. The squirrel's  
legs were spread as tho' he'd  
been trying to get a purchase on  
the ground to hold the snake.

We went back in the P.M. to  
get a picture, but both were  
gone.

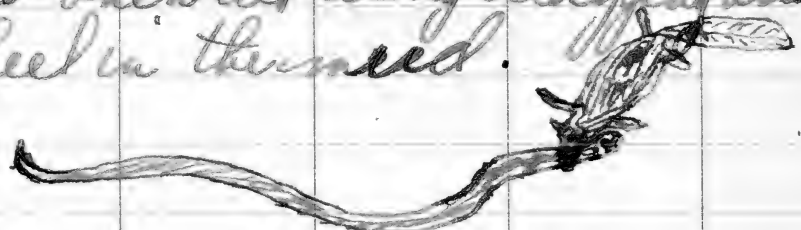
On the way back from  
Oceanquan we got a ride, &  
came in Bubbs' road, as  
we walked along I noticed  
a series of loops scratched  
in the sand, resembling those  
done by an airplane, using smoke-  
writing. I looked back, & there  
was a poor tortoise with a  
ball of the red clay, like snow  
on a horse's hoof, stuck to  
his under shell, so large that  
he could only reach the ground  
with the two feet of one side,  
at one time! The lump was



getting larger all the time,  
as he dug along the level  
stretch of red clay beside the  
road. In one place he  
had spun, like a top, gone  
on, and when we rescued him,  
was spinning again. I knocked  
the ball off, scraped his  
plate clean, & set him off  
in the grass.

The circles were almost perfectly  
round. 

The ground was ~~good~~ dug up as  
the one went along dragging and  
heel in the mud.



Lead Washington won their  
third straight game from "Bucky"  
Harris' Detroit Tigers, today,  
Myles Thomas & Fred Markery  
beating them 9 to 6. Wash.  
made 4 triples, Hayes,

Judge, West, & Rice. 1 double  
play. On a hot line drive to  
Sam Rice in Rt. field, Johnson  
(Roy) was caught at the plate by  
a wonderful peg.

E. C. Braxton won the first 6,  
Goslin & Hayes getting homers.  
Had "Sam" Jones, recovering  
from a long series of illnesses,  
beat Detroit in the second  
game, 1-0, three double  
plays killing off Detroit  
rallies. A hit & run with  
Myer on first, and Cronin  
at bat, scored Myer on a  
long single. Wash. is in  
sixth place now, but only  
1 game back of Detroit,  
& the last game of this series  
tomorrow. "Bubly" has  
won 15¢ from Maigueite  
so far, she having bet him  
5¢ on "Bucky" in each game.  
Killed 1 squirrel the week  
Mary was home. One bullet

from the 22 at 30 yds. did it. It went thru his head between the ears as he lay on a limb which slanted downwards towards the tree.

(August 27)

August 22, 23, or 24 (?) (Thurs, Fri, or Sat.)

Purple Martins must be preparing to go south. Saw a flock of about 30 or 40 flying back & forth over Thomson's house, barn, & martin box. They were in a compact group and not after insects. Blanchard says early September. I don't believe I've heard or seen those of Carl's flock for a few days.

Aug 27. Tues.

Wash. lost their last game to Dehon 9-7 in 11 innings. Two errors by "Buddy" Myers let in two runs. I played the way for more. Thus Marguerite's favorite "Nat" saved her one nickel.

Nadley, Brantley, & Marberry pitched for Wash. Marberry lost.

Aug. 27- The female orchard oriole is outside the window now, after grapes. I'm afraid they're all gone.

Darn it! I'm all joggled. I wasn't sure whether this was a female scarlet tanager or orchard oriole. I haven't seen a tanager female closely for a long time, & I never have gotten a good look at a female orch. oriole, knowing it to be such. I don't think this is an orch. oriole, but Blanchard says an oriole has a black throat. This one hasn't, but resembles closely the female orchard oriole painted in R. B. Hargrave's book of Bird paintings. This bird says: "Chirp!", "Chirp!" constantly. She was up in the walnut tree by the chicken house today, (just now) going over every limb-tip carefully, chirping all the while.



Sun., Aug. 25<sup>(12)</sup>, 1929.

Went down in Mc Mahan's woods this A.M. after hawk.

26th. Killed 1 little spread-head moccasin (hog-nosed snake) about 8 in. long, snake with a stick.

Went across new land with my gun to look thru our woods for squirrels. On fence line of new land I killed

27th. 6 ft. black snake. Blew her snake head off.

Sun. Sept. 1, 1929.

Came down lane today with gun, walking close to fence, looking for toads to rescue out of foot holes. Almost stepped on large copper head. Her head & tail were in a hole under a big 6 ft. stump serving as a fence post. I shot her once or twice with the beanshooter to break her back, & pulled her out. She faced around

& stuck out her tongue. I killed her with the beanshooter & poked in the hole under the stump with a 2 ft. stick. Out of this mole-burrow in ~~under~~ the loose ground slid the snake. I knew he couldn't get away so I shot him a few times with the beanshooter. His back was hurt, but he whirled around & slid back into a mole hole. I dug up all the ground around the stump with the little stick, & then called David to get Papa to bring the picks. Carl came instead & brot his automatic & rifle, neither of which I needed. I went for his mattock & showed him where to dig. He cut part way thru the snake, pulled him out, & shot him with the rifle. However I could have killed him with my beanshooter or gun, so he's mine.

29th. snake

Mon., Sept. 2, 1929.

went out early this AM. Got one squirrel. met Johnny hunting. He had one, also.

Shot two hawks, twice each. the first one, in the woods, at about 15 & 40 yds. or less, & the second, a large mass. hawk, in the open field, at about 20 & 35 yds.

Didn't get either one, altho ~~at~~ all four shots were perfect hits, & both hawks were hard hit. These Rem. Nitro Clubs looked odd when I got them. They haven't much killing power. The 1st. hawk sailed back into the woods, real low, & the 2nd. dropped in Bub's corn, I think.

Tues., Sept. 3, 1929.

Saw many little woods birds near the old gun tree this AM. Saw one bird which, from the bottom, looked like a female scarlet

sketch young male Tanager - 7/29/29

tanagers. Her head seemed very plump, tho, & from the middle of her stomach, down between her legs, & on back ran what resembled a half-inch wide streak of blood. It was some sort of red marking.

Saw also what appeared to be weevils in the trees, quite a number of them.

In a hickory I saw a small thrush, a very little (if any), larger than an Engl. sparrow. His upper breast was thickly spotted with small round dots (like B. B's.) He was very tame, & flew about picking insects, also sitting still for short spaces of time, looking about. Over bird (?) - 7/29/29

Monday, Sept. 9, 1929

30th. Killed one king-snake in back yard today. I didn't want him to go in on the porch. I shot him thru the body as he



Sept. 12, 1929.

went under the steps. Papa tried to pull him out & he pulled in two.

The dogs were playing with me outside just now (about 8 o'clock). We wouldn't let them come in the gate, and a few minutes later I heard a shot down at Bob's barn. I went out & whistled, but the puppy didn't show up.

I'm afraid he got his. Suppose Buck was mad over taking the puppy.

Fri. Sept. 13, 1929

Pappy was seen this morning. I don't expect to see him again.

Went hunting in Bob's woods this AM. Shot 3 flocks of tree-squirrels. At the pond I saw 1 hairy woodpecker, 1 black & white-creeper warbler,

1. Red-bellied woodpecker  
2. Yellow-bellied woodpecker  
3. White-bellied woodpecker  
4. Red-bellied woodpecker  
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100. Red-bellied woodpecker

saw in Maryland Yellowthroat.

Thurs. Sept.  
12, 1929.

went under the steps. Papa  
tried to pull him out & he pulled  
in two.

The dogs were playing with  
me outside front lawn (about  
8 o'clock). We wouldn't let them  
come in the gate, and a  
few minutes later I heard  
a shot down at Cub's barn.

I went out & I was excited, but  
the puppy didn't show up.

I'm afraid he got hit.  
I suppose Cub was mad  
at me for the subject  
they.

Fri. Sept. 13, 1929

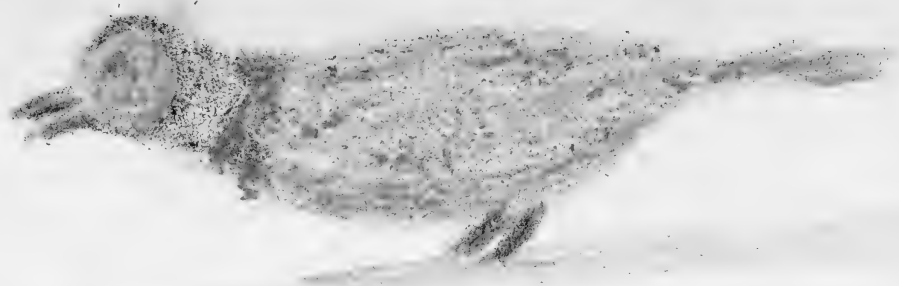
Puppy was here this morning.  
I don't expect to see him  
again.

Went hunting in Dub's woods  
this A.M. Shot 3 flocks of  
tree-surgeons. At the pond I  
saw 1 hairy woodpecker,  
1 black & white-creeping warbler,

2 redstarts (the first  
I've seen in some time),  
many pine warblers,  
several downy woodpeckers,  
and many nuthatches,  
chickadees, & titmice, all  
of which I couldn't see, because  
of the poor light. Up in top  
of the Big oak in which many  
of them were working, were  
two birds, resembling shrikes  
from below, & of almost the  
same color. They darted back  
& forth as the other flocks  
other flying insects. Because  
of the dull, gray, cloudy sky  
the birds were hard to identify.  
I named the redstarts first by  
their spread tail & wings before  
I saw their colors. "Hairy"  
certainly can drum. This  
flock must have numbered  
several dozen birds.

Saw a young, or female,  
Maryland Yellowthroat.





$$\begin{array}{r} 10.320 \\ 10.320 \\ \hline 10.321 \\ \hline 10.941 \\ \hline 10.320 \end{array}$$

$$\begin{array}{r} 10.320 \\ 10.250 \\ 10.180 \\ 10.119 \\ 10.050 \\ \hline 5/50.9196 \\ \hline 10.1839 \end{array}$$

$$\begin{array}{r} 10.120 \\ 10.119 \\ 10.120 \\ \hline 10.3590 \\ \hline 10.1196 \end{array}$$

$$\begin{array}{r} 11.030 \\ 10.120 \\ \hline 10.910 \end{array}$$

$$\begin{array}{r} 11.030 \\ 10.183 \\ \hline 10.847 \end{array}$$

$$\begin{array}{r} 11.030 \\ 10.320 \end{array}$$

$$\begin{array}{r} 14.030 \\ 14.052 \\ \hline 10.948 \\ 10.320 \\ \hline 10.628 \end{array}$$

$$\begin{array}{r} 1.052 \\ \hline 52 \\ \hline 52 \\ \hline 2652 \\ 0.1610 \end{array}$$

James W. Shackelford

Mrs. Shackelford  
 The Netherlands - 15th St. Road.  
 Columbia 0810



1. Least - common ground warbler - (on January 1st)
2. White-throated green warbler
3. Green warbler
4. Black - & white warbler (white - throat)
5. White-eyed vireo + (at 4000 ft. in the mountains)
6. Scarlet tanager - (in the mountains - Redwood)
7. Myrtle Warbler (X) - (in the mountains - Redwood)
8. ... (in the mountains - Redwood)
5. may be Least Flycatcher (?) in the mountains

1. Hawthorn warbler - (Yellow - throat) - (in the mountains - Redwood)

4/25/29 - Saw the first scarlet tanager, in the mountains - (in the mountains - Redwood)

4/27/29 - Saw beautiful little clear gold finch - (in the mountains - Redwood)

4/28/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

4/29/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

4/30/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/1/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/2/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/3/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/4/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

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5/7/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/8/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/9/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/10/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/11/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/12/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/13/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/14/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/15/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

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5/18/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/19/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/20/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

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5/22/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/23/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/24/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/25/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/26/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/27/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/28/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/29/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/30/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

5/31/29 - Saw a large number of about 1000 - (in the mountains - Redwood)

James E. Eike

Expt. 4

B. S. I. A.  
3/13/29

Line I

$D_1 = 310 \text{ cm}$

$D_2 = 7.8''$

$D_3 = 12.50''$

$D_4 = 17.35''$

$D_5 = 22.30''$

$D_6 = 27.10''$

Line II

A rather nice young turkey  
chick (juvenile). The upper gold from  
whiskers with a small white  
under body. The head, back & breast  
were gold.

In the relative I saw a small  
with olive & dark gold on the  
feathers of the neck. I saw this  
red & yellow, but I saw it  
again in a different place.

4/1/29 - on March 29 I saw  
saw 2. adults - the male  
1 on Maryland yellow





May 9, 1929

Hooded mangle

Black body, black throat, black  
hoof. Orange-brown when wet.

On wings, all of upper part, yellowish.  
Throat black, throat yellowish.

At given time, black - yellowish  
under body - white feet on back.

Yellowish - with orange-yellow feet  
on chest and yellowish - yellow body.

1 no. black, blue-grey body yellowish -  
black. Black head on back to neck. Body  
black, all from chest. Underneath black. Yellow  
Circle on back about 1/2 in.  
Hooded mangle

Things as follows: grey body, yellowish - black - orange  
black. Black head, black body. Yellowish  
on upper part. - Parula W.?

1 redstart - black & white striped on top of head  
1 pr. yellowish - black & white striped on top of head  
1 pr. black & white striped on top of head. White  
black & white striped on top of head. Black & white  
black & white striped on top of head.

5/12/29

1 warbler - head & back red,  
yellow streaked below (wings), yellow red  
on throat, bordered on all sides by slate. Narrow  
slate line below yellow throat. From yellow  
heart, with red-brown line - under white to

1 Redstart?

Blackpoll?

1 warbler - black crown, red on sides  
of head, eyes, black on throat, thin line of  
black on breast, black on wings, black on  
back, black on tail.

with black & red streaks, dorsal on wing  
along back.

In square - one warbler - black on  
long show belt - two white feathers - tail long  
white in flight - white downy on  
tail - long & very much like a Pheasant.

Blue winged warbler



1. Chestnut-sided  
Throated  
Pine Warbler





5/7/29.  
found yellow - l. - One hatched in garden  
the nest. ~~the~~ feathers in front of chicken house.

5/8/27  
Saw one in the evening on clatter-bane.  
Felt it should be a stage of *ph. t. s. f. n. s. t.*  
Young up 5 pieces of string. He & wife were  
in cherry tree also. male & female on side.  
Female was there also. *ph. t. s. f. n. s. t.*  
Summer tanager in wild cherry tree, singing.  
Myrtle warbler (?) in garden on ground. Yellow  
billed cuckoo singing in tree in back of tree.  
The cuckoo was singing at this also.  
7 Larks of myrtle warbler on lot.

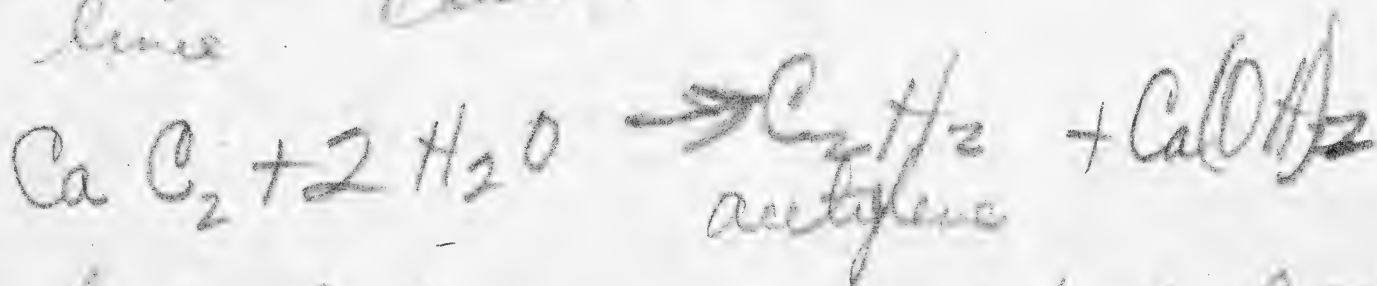
5/9/29  
2 dog, *therapsid*.  
Red brown on face. Sides large  
dark brown, bluish, big dark eyes, buffy-gray.  
Underneath - dark buff with orange throat. Hair  
lighter on sides (young and yellow to red)  
at angles.  
Hair of yellow washed out of length.





Ca C<sub>2</sub> —

V

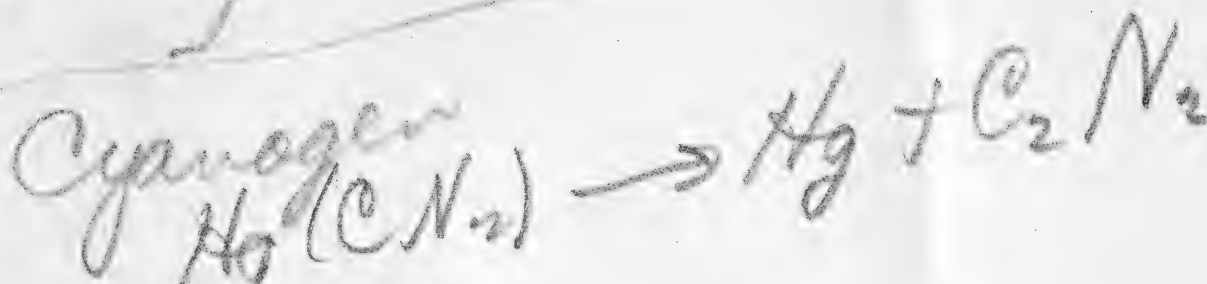


Starting pt. in manuf. of NH<sub>3</sub> & fertilizers,  
HNO<sub>3</sub>, explosives etc.

Carburenum —

SiC

coke, sand, salt & sandust.



H CN —

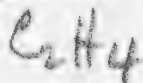
Hydrocarbons

Methane series

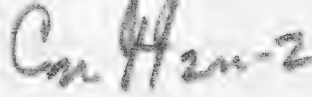


methane — CH<sub>4</sub>

Ethylene —



Acetylene —



Benzene





Kildeer - Feb. 12, 1930  
& several weeks earlier

Feb. 13 - 1930  
Woodthrush

Kildeer - Feb. 20, 1930.  
Hermit Thrush - Feb. 21, 1930

Fox Sparrows - Feb. 25, 1930.  
Long-billed Marsh Wren -  
April 5, 1930

Wilson's Thrush - April  
19 - 1930 ?

Late Date - Myrtle  
Warbler - Apr. 27, 1930.  
A. Wetmore - May 30, 1930.

Late Date - Myrtle Warbler  
May 3, 1930.

Number

Rate

Cong. Dist.

aval Service

Minority

rade



E. H. Forbush says Penit. <sup>is</sup>  
has no real trill - "a slow  
monotonous succession of  
soft whist notes like early  
chipping sparrows, but slower with  
longer intervals between notes  
which slow it" - All other  
here sing a very rapid - sharp



4 clear full very pretty - also  
their beautiful, liquid, less  
common "dede-dede-ree-ree"  
song. Also the laughing  
"wicky, wicky, wicky" song, which  
I heard young ones sing

(8/10/20 - 9:35.



ated.) Matching 3-piece Vanity Set. One piece 17 x 5 in.; 2 pieces 8 x 12 in. (2½ yds. edging required.). 39¢

**X67E69**—Package of four-strand wash-fast Rayon Floss to embroider any one of the above numbers.—we pay postage. 38¢

**Ready-Made Hand-Tinted Circular Apron**



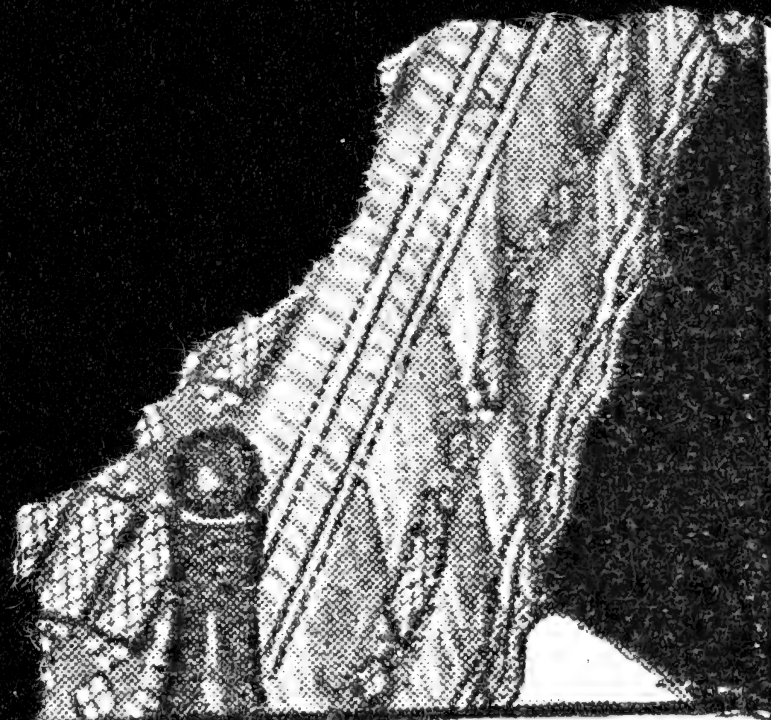
**Rayon Edging 10¢ yd.**  
WE PAY POSTAGE

Stamped pieces of good quality natural linen color Cotton Art Cloth in pretty butterfly-and-flower design. (Edging not included. Instruction chart included.)

**X67E33**—Stamped Pillow Top. Plain back. 16 in. square. (Requires 1¾ yds. edging).—and w.

**X67E34**—Scarf to match. Size about 16" x 24" (Requires 4 yds. edging.).....—and w.

**X67E35**—Centerpiece or table runner.



for Thrifty Housewives

**D** and men's shirts. About 36 inches wide.

**E 51E1355**—All-Silk Washable **Radium**. About 36 inches wide. For dresses, slips, etc.

Each of the above materials comes in the following COLORS: passion flower, Castilian red, English violet, Pandora green, sunburn tan, Byrd blue, Spanish wine, spun gold, cactus rose, Jeanne d'Arc blue, Hawaiian brown, jade green, golden poppy, tan, Imperial blue, French beige, rose petal, marron glace, Zeppelin green, claret wine, Copen blue or navy blue (all illustrated on opposite page); also flesh pink, pilot blue, orchadee, sun star, honeydew, midday blue (light navy), silverwing grey, briar rose, cameo nile, maize, sherry brown, pink, cocoa, coppersheen (reddish bronze), English green, chalet red (bright rust), Monticello green, white or black.

Order by style number for material and state color desired.

OUR PRICE, Each; A yard. **94¢**  
—and we pay postage.



# JUST FOLKS

By EDGAR A. GUEST

## THE PRIZES.

Said an old-time champion to me, as  
he showed me many a prize,

Which he had won in his earlier days:

"Are they dazzling to your eyes?

You think them precious to hold and  
keep, but the fire I would  
throw them in

Could I only be the boy once more  
with his first prize yet to win.

"These are trophies of victory, and  
time was I thought them sweet.

But I'd rather be out there playing  
now and facing again defeat

Than sitting here in an idler's chair  
with my prizes round me lined,

With nothing to dread, and nothing  
to risk, and nothing to stir my  
mind.

"Oh, the game is more than its prize,  
my boy, as soon you will come  
to know,

The joy of the race is in running it,  
and not in the thing to show.

I've cups and medals enough to  
spare, but I'd give them all to  
claim

The thrill of the youngsters strug-  
gling there who haven's yet  
won a game.

'Now I'm settled down and watch  
them go to the fields to lose or  
win,

With eyes agleam and with hearts on  
fire they'll battle through thick  
and thin,

And I'd rather be those who will lose  
today, and tomorrow will try  
anew,

For they still have the joy of the  
game, while I am left with a  
prize or two."

bonuses and stock pro  
many of the Company's  
were entirely eliminated  
be 6.60 per cent.

A net profit of \$13,07  
from the redemption or s

The surplus earned d  
on the values entered  
amounted to \$42,863,5  
sum substantial appropri  
been made to further str  
of the Company.

An additional \$10,000  
ducted from the market  
ties as a provision agai

# SUN CON

4t



"WE know ourselves so little that many think they are about to die when they are really in good health, and many think they are well when, in fact, they are on the brink of death."

That is not quite so true today as it was when Pascal penned it three centuries ago.

Popular education and readable books on physiology have helped. The popular rules of health are based less on superstition and more on science than was the case a hundred years ago.

Still, the body we live with from infancy to old age is largely a stranger to us.

Just for a test, try yourself on these 20 facts about your body. How many do you know?

They are noted from the first 200 pages of Dorsey's popular book, "Why Behave Like Humans?"

1. One-fourth of all our muscles are in our neck and face.

2. If one-third of our skin is destroyed by fire, acid or other accident, we die.

3. We have 32 teeth; eight on each side of each jaw; that is, two incisors, one canine, two bicuspids, and three molars.

4. A man 150 pounds in weight would weigh 50 pounds if he were thoroughly dried out. Our blood is 90 per cent water. Our bones are nearly half water. Conscious brains are 85 per cent water.

5. To balance our head on our spine, we use 20 muscles. To balance our spine when walking we use 144.

6. In walking, each leg rests half the time. We tire standing because neither leg gets rested.

7. With every step we take about 300 muscles are used.

8. Our body temperature is regulated and remains constant at 99 degrees.

9. We average about one square foot of surface and about 90 square yards of face.

10. Normally we take one breath four heart beats.

11. If you stay quietly in bed you save heart 20,000 beats a day.

12. A 160-pound man has about eight pints or four quarts of blood. He can lose up to one and-a-half quarts at a time and recover.

13. Your heart beats 40,000,000 times a year. It drives the blood through the arteries at the average rate of 30 feet a second. When you sit quiet it pumps about five pints of blood a minute. When you run uphill it pumps seven times as much, or 35 pints.

14. The motor mechanism with which we walk weighs about 80 pounds. Sixty is muscle and 20 bones.

15. A man can sweat as much as 10 pints in a day.

16. It is impossible to commit suicide by holding the breath, because as soon as consciousness is lost breathing automatically begins again.

17. About 50 per cent of our body is carbon.

18. The average muscle is 25 per cent efficient. The trained muscle is only 40 per cent efficient.

19. We have 2,000,000 tiny pores or sweat glands. There are 500 to the square inch on most of our body, and 2,000 to the square inch in the palms of our hands and the soles of our feet.

20. Just to keep the heart beating, the lungs functioning and the body at the right temperature requires 1,700 calories a day—enough energy to lift 200 tons a foot.

(Copyright, 1927 New York American, Inc.)

## MORE TRUTH THAN POETRY

### LADY ISABEL AND THE THIRD PARTY,

By S. E. Kiser

THE Lady Isabel possessed  
A proud patrician air,  
Although the clothes in which she dressed  
Were hardly more than fair.

WITHIN her gray ancestral halls  
The scene was seldom gay;  
The beams that rested on the walls  
Were weakened by decay.

THE old earl  
Wasn't feeling  
well,  
The words he  
spoke were  
sad.

But proudly Lady Isabel  
Addressed her titled dad.

"BE not downcast, old dear," said she,  
"The outlook's not so worse;  
Good luck's in store for you and me  
Despite your empty purse."

TOMORROW Prince Gazooks arrives  
To ask you for my hand;  
I'll be the second of his wives,  
The first one he has canned.

AND he will find a way, I know,  
To save our proud estate;  
A fortune teller told me so,



And said, as happily he smiled:  
"I'm feeling better now."

BUT Prince Gazooks came n  
Gal's heart is like to bu  
A movie queen from Holly  
Got to his highness

OCCASIONALLY opportunity will make  
man, but he can't always hold the job

ugham.  
all good tires.  
terms.

0 Roadster.  
just like new; fully

ress 80 4-pass.

ort Touring.

little; looks and runs like  
equipped. \$895.

R CAR IN TRADE.

erless Motors Co.

Factory Branch,

th and P Sts. Main 9850.

Also

722 17th St. N. W. Fr. 633.

Open Evenings and Sundays.

## Chevrolets and Fords Complete Selection

1925 Chevrolet Roadster, fully  
equipped; looks like new; priced  
right. \$100 cash, balance 12  
months.

Buick 1924 Roadster, 4 wheel  
brakes; car in wonderful condi-  
tion. \$100 cash, balance in 12  
months.

1925 Ford Coupe, in tip-top  
shape; extras; priced right. \$100  
cash, balance easy.

1926 Chevrolet Landeau, fully  
equipped; perfect throughout.  
\$150 cash; balance, 12 months.

1925 Ford Tudor Sedan, in ex-  
cellent mechanical condition; a  
real bargain. \$75 cash; balance  
easy.

R. L. Taylor Motor Co.  
Used Car Dept.

1827 14th St. N. W.

## LOSSAL SALE OF ED AUTOMOBILES NOW GOING ON

er 100 Cars of All Kinds  
ED FROM \$50 TO \$1,200

ph McReynolds  
baker Building

R and 1706 14th St.  
venings and Sundays

YOUR CAR

LED & PAINTED

NTHS TO PAY

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32 Vermont Crt. N. W.  
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In excellent shape

OR CO.  
Line. 303

used cars and  
res. parts, for  
Line. 7635

NGE ANI  
n the Dis  
ompt at  
low

306

Per  
\$195.

25 TUDOR SEDAN

oon tires. Fully equipped; will sacrifice.

## ESSEX COACH, 1926

The motor is smooth and economical. Just out of the paint shop  
and looks like new. Fully equipped. Only \$425.

1926 Hudson Brougham.....\$850  
1926 Essex Coach.....450  
1924 Hupp Sedan (in paint shop) 450  
1924 Buick Master Touring (in  
paint shop).....450  
1924 Chevrolet Roadster (in paint  
shop).....175  
1925 Essex Coach.....375  
1925 Hudson Coach.....525

1926 Ford Roadster.....\$250  
1926 Ford Tudor.....325  
1925 Ford Tudor.....200  
1924 Ford Coupe.....150  
1923 Ford Sedan.....60  
1924 Chevrolet Touring.....150  
1924 Maxwell Touring.....250  
1924 Ford Touring.....50

## Lambert-Hudson Motors Co.

1722 L St., West of Conn. Ave.

## Packard

Asks You to Inspect Its  
Renewed Cars  
We Want You to Know  
What a Good Car a  
Renewed Packard  
Can Be

You Specify Your Own  
Colors,

Your Favorite Tire,  
Just How You Want  
Your Motor Done,

Then We Prepare the  
Car to Your Order

Each Owner Takes a  
Particular Pride in

Such a Car

Let Us Show You How  
We Do It

Packard Washington  
1707 Kalorama Rd.

## Figure What

You Can Buy With What  
We Save You on a  
Good Used Car

1927 Peerless 6-80 De Luxe Sedan.

1926 Chrysler 70 Roadster.

1926 Buick Standard Coach.

1926 Studebaker Big 6 Sport Road.

1927 Buick Standard Coupe.

1927 Hupp 8 Sport Touring.

1926 Chrysler Touring.

1925 Nash Special Coach.

1926 Franklin Ser. 11 Sedan.

1923 Marmon Sport Sedan.

ALL GUARANTEED  
TRADE-INS

1924 Chevrolet Touring.....\$75.00

1922 Willys-Knight Touring ...150.00

1924 Durant Touring ..... 50.00

1923 Chevrolet Touring (new  
tires) .....100.00

## Southern Motor Sales

1324 14TH

POT. 3551

## \$25 CASH

When Used as a Deposit Will Hold Your Car.

THINK

of the many happy days ahead and be sure  
you see our wonderful display of "Used  
Cars." Large assortment. All reconditioned  
standard makes.

## YOUR CAR IN TRADE

Chrysler Coach, 70 ..... \$790  
23 Studebaker Sedan, refinished ..... 375  
23 Nash Coupe, refinished ..... 525  
24 Studebaker Coach ..... 650  
24 Oakland 6-54 Sedan ..... 550  
26 Nash 263 (Advanced) Coach ..... 975  
25 Willys-Knight Coupe-Sedan ..... 650  
23 Essex Touring, better ..... 275  
23 Essex Touring, best ..... 200  
25 Nash Special Coach ..... 550  
23 Auburn Touring ..... 75  
23 Nash-Elsworth ..... 250  
24 Red-Durant Sport ..... 225  
22 Maxwell Touring ..... 38  
23 De Luxe Nash Sedan ..... 475  
24 Light Six Studebaker Sedan ..... 450  
23 Dodge "Collegiate" ..... 125  
26 Ford Tudor ..... 385  
26 Overland "6" Coupe ..... 550  
24 Hupp Touring ..... 398  
24 Buick "Cabriolet" ..... 625  
26 Pontiac Coupe ..... 595  
24 Durant Sedan ..... 250  
23 Rickenbacker Touring ..... 425

## ROADSTERS

Some with rumble seats. Late models.  
Right prices. Any demonstration. See  
these cars before you buy.  
1924 45 Buick Roadster ..... \$590  
1925 45 Buick Roadster ..... 725  
1925 Advanced Nash ..... 850  
1927 Nash Roadster ..... 1,250

## "SPECIAL OFFER"

Something new to offer you! Only driven  
2,834 miles—and sold under our written  
new-car guarantee. A chance to save a  
couple of hundred dollars in buying a

1927-NASH-235  
Coupe. Done in Two-Tone Duco,  
Fully Equipped.

## WALLACE

FOR BETTER USED CARS.  
1709 L St. Open Until 9 P. M. Main 7612

## CHRYSLER

## Used Car Department

1926 Chevrolet Coupe.....\$495  
1926 Chrysler 70 Phaeton..... 895  
1924 Maxwell Touring..... 225  
1927 Dodge Coupe..... 775  
1926 Ford Coupe..... 325  
1925 Maxwell Club Sedan..... 525  
1925 Hup Coupe..... 525  
1925 Essex Coach..... 450  
1926 Overland 6 Coach..... 600  
1925 Willys-Knight Sedan..... 740  
1925 Flint Touring..... 300

And Others

H. B. Leary, Jr., & Bros.

1612 You St. N. W.

Phone North 4296

FORD ROADSTER, 1926—A wonderful buy  
for \$225; terms.

DONOHUE MOTOR CO.

215 Pa. Ave. S. E.

Line. 303.

## CHRYSLER

(Used Car Department)

1925 Chevrolet Coupe  
1925 Dodge Sedan  
1926 Chevrolet Lan. Sec  
1924 Dodge Coupe  
1926 Chrysler 58 Coup  
1924 Maxwell Club Se  
1924 Ford Coupe  
1925 Chrysler 70 Ro  
1925 Chrysler 70 B  
1926 Nash Adv. 6,  
1925 Ford Sedan  
And Ot

H. B. LEARY  
& BROS.

1321 14th

Phone N

REAL I

Chrysler 70 Coach  
brand new; in e  
Cadillac 51 Phaeton  
Buick Coach, late  
Paige Brougham  
Packard Tour. Sed  
Peerless 8 Coupe  
Chrysler 58 Coup  
Hudson Coach.  
tor  
Chalmers Coach.  
Jewett Brougham  
Hudson Speedste  
car  
Packard Touring  
Maxwell 4-pass  
Essex Coach, la  
Oakland Roadst  
Ford 1926. To  
Many other

UNION S

51 Eye St. N

Hupp Tour.  
Jewett Coach  
Durant Coupe  
Durant Sport  
Star Sport  
Dodge Tour  
Chandler  
These  
and are



His mask was fully formed, but light in color, with yellow apparently showing thru in streaks. He was very busy hunting in the small alders on the edge of the pond, together with several relatives that I couldn't see. Once he dove into the water with a splash.

Saturday, Sept. 28, 1929.

31st. Coming back from Occoquan this A.M., I killed a little foot-long copperhead snake in the woods back of the cellar. The chickens were after him. In striking he left the ground a foot.

Went down in Bubb's to meet Bob to get cake for my birthday. Killed 1 cooper's Hawk with .22 rifle, circling him & cornering him in the branch opposite the "Little Bridge". While following him thru briars I killed a large rabbit in his bed.

Sun. Sept. 29, 1929.

Got a shirt, necktie, 3 pairs of socks, pr. pajamas, 1 pr. garters, 1 bird guide by Reed, & 1 Wild Flower guide by Reed.  
Sun Oct. 6, 1929 Joe shot up the last of my bullets. Saw a squirrel back of pond.

Mon., Tues., or Wed., Oct. 7, 8, 9, or 10, 1929  
Saw first southbound white-crowned sparrows on path just past big oak. That one was even bird at first. Must have been female or young, since there was no black on head.

Friday, Oct. 11, 1929.

Saw a number of white-throated sparrows near road this evening, about 4:30. In leaves, but flew up. Tried to trace them into whistling, but the one I tried would only chirp. His lores were almost lemon-yellow. I heard one of these sparrows sing this A. M. at Canney, about 7:00.

2070 Doyle

Saw a yellow throated vireo several days ago, & have seen hairy woodpeckers several times lately.

Saw a very busy bird in the old willow tree in front of Rob Weyland's store last Sat. It seemed to be a female blackgold warbler or perhaps one of the vireos.

Sun. Oct. 6 or 13, 1929.

Killed foot-long young copper-32nd head in side of old pine stump beside creek from Castle woods to pond.

Killed gray squirrel in woods back of house. Killed 1 rabbit just over hill at dark, & could have killed 2 more.

Sun. Nov. 3, 1929

Have seen several dozen kinglets lately, the first ones about two or 3 weeks ago, on the hill above Babbi's ranch. Most of them were golden-crowned.

Saw several red-breasted nuthatches at the pond about 3 weeks ago. I believe I have seen them here other winters but am not sure.

Have seen the usual flocks of nuthatches, titmice, chickadees, black-&-white creepers etc., lately.

Have not seen that Hermit(?) Thrush for about 2 weeks. He stays for over a month in the hickory trees down in the pines near the road.

Saw what I believe was a Veery or Wilson Thrush about 1 week ago.

Many Field Sparrows around lately. Flocks of Robins have been around lately, mostly coming from the ~~area~~ north, where they went some time ago. Many bluebirds around lately also, in flocks.

Fri. Jan. 24 - 1930

Two (2) inches or more of snow has been here about 2 weeks. It's all ice underneath. Saw a large



black of robins in the pines  
beside the road this eve, coming  
from school, about 4:45.

On the last piney hill about  
5 of them were eating holly berries.  
Sat. Jan. 25, 1930

Saw one large robin at  
Morgan's gate. He was very  
friendly, and kept chirping, acting  
as tho he knew me. He may I  
have at that. He was eating some  
kind of berries off a tree, I forgot  
what kind.

I saw a cute little golden  
crowned kinglet in the cedars by  
Peggy's garden ~~up~~ some weeks  
ago. They come around once in a  
while.

Mon. 27, 1930. Jan.

Snow about 1 to 2 ft. deep.

Mid year tests started 23 last  
Thursday.

Thurs. 6, Jan. 1930.

Heard a tufted titmouse

whistling in the big trees  
on Y. U. Campus this  
morning. He was whistling  
just like the one I heard  
up here last year. He sounded  
like a red-bird.

Fri. 7, Jan. 1930.

Saw large robin today,  
in Pines.

Sat. 8, Jan., 1930.

Many tufted titmice and  
chickadees, also up thatches  
around today. In hundreds of  
cracks on the Oak tree there  
are acorns which they have  
opened after sticking them  
tightly. They were singing and  
fussing and came to the ground  
after after acorns. They are  
flying back & forth everywhere.  
If it were not for this cold  
South wind it would be nice  
here today.

flock of robins in the pines  
beside the road this eve, coming  
from school, about 4:45.

Wed. 12, Feb. 1930.

Heard Kildeer calling  
this evening as he flew  
over. I heard one several  
weeks ago, also. Sounds  
like spring.

Thurs. 13, Feb. 1930.

Heard a wood-thrush  
singing in back of the  
tomato Canary a 7:00 A.M.  
It was raining and the red-  
birds were whistling.

Sat. 15, Feb. 1930

Started to snow this  
afternoon around 2. Snowing  
fast as the dickens. Stopped  
about 8 or 9. About 1 in. of snow  
in most places, very light.  
Wet ground from thaw melted  
most of snow.

Sun. 16, 1930 - Feb.

Many came home yesterday  
eve! Its pretty cold today,  
and the wind blew this  
A.M. Many left at 6:45 to  
catch 7:15 train. Found out  
later it didn't leave until  
7:38. Moved back to its  
old time.

Wed. 19, Feb. 1930

Bluebirds singing this  
A.M., as were white-throated  
sparrows, fieldlarks, titmice,  
blackbirds chirping.

One of most beautiful spring  
days I've ever seen. Not as  
a summer day. Watched work  
on new school building.

Thurs. 20, Feb. 1930

Temp. 76° in Wash. Broke  
56 yr. old record. Same birds  
as yesterday. Bluebirds singing



happily. Killdeer flying over-  
head, same as some weeks ago  
before snow. Their calling sounds fine  
Fri. 21, Feb. 1930.

Hermit Thrush { Boots caught a small  
thrush this A.M. A hermit, I  
guess; I'll have to look it up. Little  
devil! Bluebirds were building  
in paper boxes in Horner's land  
this morning. Carl saw wild  
geese go north several days  
ago. Two pairs of red birds  
(Cardinals) were chasing each  
other around on the lot this eve about  
6:00 or later. They didn't seem to  
have definitely mated as they  
did not keep in separate pairs in  
their love-making. The last  
three days have been some  
of the best I have ever  
experienced.

Frogs have been singing  
since Thurs. or Wed. eve.

Sat. 22, Feb. 1930.

Robins singing. Blackbirds  
really singing this time, down  
in Thompson's.

Snowbirds singing their  
spring love song today.  
One was in Metgers garden  
singing a little hissing wing  
trill, then flew gaily into the  
grass.

Spanrows & bluebirds  
singing and nesting.

Redbirds singing, also  
chickadees, titmice & nuthatches.

Crows everywhere.

Sunday 23, Feb. 1930.

Robins & other birds  
everywhere. 50 or 100 robins  
eating on ground in Bubbi's  
field. Little frog jumped  
in water opposite red mud in  
field, when I came back from  
going out to open gate for Carl,  
Mary & Joe.

Swamp in Aitkin County, Minn.  
sold - bird paradise.

Monday 24, 1930, Fed.  
Spring again after slight  
cloudiness yesterday, with  
mist. Birds everywhere.  
Thousands of frogs. Papa  
heard a hawk screaming  
today; not whistling. Killdeer  
singing. Read bird magazines  
in Congressional Library today.  
Especially the "Auk". Read fine  
article on Connecticut ~~auto~~  
warbler. It told of finding nest,  
eggs & mother in Minnesota.

Thundering, and lightning  
flashes since about 8 or 9. It's  
now 10:50 P.M. & has been raining  
about  $\frac{1}{2}$  hour. A spring shower.

Heard a wood-thrush  
singing again this ~~morning~~ morning.  
Heard a dove cooing this  
evening, somewhere near  
Seard's. The first one I've  
heard this year, and a  
good sign of spring.  
Saw 3 large ducks flying

north about 7:00 A.M., over Babbs'  
gate. Looked creamy yellow underneath.

Tuesday 25, 1930 - Feb.

Heard a hawk screaming near  
pond about 6:55 A.M. as I went over  
hill. Birds singing everywhere.  
Killdeer & Bluebirds. A robin  
was singing his spring song, in parts.  
Frogs are singing constantly.

Tues. or Wed(?) Saw a large  
number of birds in march  
near culvert at road about 7:00 A.M.  
Among the cardinals were many  
birds I took to be fox sparrows  
altho they seemed much larger. They  
seemed almost a red, so bright  
was their brown. Their breasts  
were heavily blotched. Not being  
in a hurry I watched them. I  
finally became aware of a rabbit  
"froze" in a little open space. I  
tossed a rock at him which hit  
a small alder tree above him,  
drapping a ft cloud of yellow



pallen dust which floated away. I tossed another, and he still didn't move a muscle. I then went off and left him.

The birds resembled chowwinks in their build, but, altho I couldn't see them very long, I am sure they were not.

I wonder if those flocks of birds I've seen this winter could not have been Horned Larks or Prairie Horned Larks? I saw them many times over the corn fields, always flying a good ways up, so that they could only be seen as having grayish under parts, or brownish. The large flocks always gave forth a loud twitter, somewhat lilting & musical.

Thurs. March 6, 1930

Have been home since Monday. New shoes wore a blister on my left big toe Monday a week ago, & it

kept getting worse. Sat. The doctor saw it & had me put something like antiphlogistine on it. It drew out about a tea-spoon-ful of ugly pus. But my toe is far from better.

While sitting on the front porch today, a cute little song sparrow lit on a post in the garden fence, by the forsythia, and sat there a minute, showing his little shield. The mockingbirds have been visiting their water pan every few minutes. All winter only one came, then the sparrows & cardinals joined the "water line".

Now there are 3 mocking birds here. Fri. March 7, 1930-

Nasty day today. Driest east wind & driving rain (drizzle). Cold & blustery, a typical March day.

On a "trot line" this A.M. Carl caught a large "cat fish" <sup>and</sup> that weighed around <sup>26 lb. 5 oz.</sup> 33 or 35 lbs. It was a giant; with the head off, Arvilla had to cut it in two pieces to put it in a large roaster.

March 24, 1930 - Mon.

Doves have been cooing now for days. Snowbirds have been singing their little twittering songs, preparing to go north. I haven't seen any for some days now, perhaps they are gone.

Frogs are singing by the millions, apparently.

March 25, 1930. Tuesday.

Holiday today - Founder's Day. Foot has gone bad again.

Saw several chip sparrows singing in the oak tree & cedar, & down in black cherry tree front gate. Song sparrow singing on garden fence almost back of stable.

29 male cardinal singing in locust tree. A big starling certainly looked beautiful with the sun shining on his metallic feathers.

Violets are blooming in Carl

garden - The forsythias have been blooming about a week or two and are wonderful, especially when the bright sun shines on them.

For the last 10 or 20 minutes. (It is now 1:05 P.M.) a bird has been very vigorously, almost hysterically been calling "skew-weet" "skew-weet"; over and over continuously. I thought it was the mocking bird imitating a flycatcher & told mama so, but finally I went out, and away flew Blanche out of the small wild cherry tree. He went to the one down at Babbie's orchard, and then came back to a little apple tree by the raspberries, where I identified him. He's still screaming at the top of his voice.

A flicker just flew by. At noon I watched one fly for about one or two miles.

(7/11/30)



over Bogies, over our woods, &  
finally come to rest far over  
in meadow on Sandy's old place.

A meadow lark was singing in  
Zub's orchard this A.M.  
Saturday, March 29, 1930

The phoebe is still here. I  
heard him calling this A.M. He  
must be lonesome without even  
another male around, let alone  
his mate, who'll get here later.  
I wonder if he came north alone,  
or did he just drop off here at his  
old home. He seems to know  
the place pretty well.

I have something else  
to wonder about now. Out in  
the hammock now, about 2:15 or 2:30 P.M.  
I heard "skwip, skwip." Each  
note came out rapidly, but one  
could not say sharply or harshly.  
Up in the locust tree was  
a small, slim, bird, about  
the length of a sparrow or perhaps  
shorter; slaty-grey or black on

the back, head, wings, & tail.  
Underneath grayish white,  
but nearer grey, with dull  
black stripes or blotches (i.e.  
they were not clean cut lines) several  
rows wide, starting at the top  
of the breast (or base of neck) and  
extending down sides to  
legs or there about, close  
up to wings on sides.  
Slight indication of what  
might have been a faint yellowish  
grey collar about throat, but  
probably was not. Flitted &  
rapidly about, hardly  
ever remaining still for an  
appreciable length of time,  
changing position every second,  
dashing back & forth from  
limb to limb, & tree to tree,  
continually calling "skwip." He  
became interested when I answered,  
but soon flew over to the  
woods or apple trees. Repeatedly it  
caught flies, gnats, etc. on

the wing with all the dexterity  
of a flycatcher. Picked something  
off a limb once. Had two indistinct  
wing bars, very narrow, white,  
might have been just underside  
of feathers. Unusually one wing  
seemed somewhat out of place  
at first, but his flitting restored  
them nicely. His eyes were  
black & shiny, I believe, & I  
think he had a slim bill.

He was in the locust tree, the wild  
cherry, small cherry tree by corner of  
porch, in apple tree in garden, etc.  
Slightly like female blackpoll. Kirtland Warbler

A pair of chickadees was in the  
garden & front yard for a while, &  
one then chased the other into the woods;  
I guess they'll be mating before long now.

Sunday, March 30, 1930

Went out for long walk today  
for first time in 4 weeks. Partly  
cloudy today, sun shining bright in

between.

Just before going down last slope  
to pond, I saw a number of little  
birds, high up in the pines. After  
looking at them I decided they were  
pine warblers, except I see now  
that <sup>Red</sup> ~~Darwin~~ shows no deep fork in  
the tail. They were a bright (i.e.  
heavy) gold on head, throat, neck,  
breast and underbody, and back  
also, I believe, all overshadowed  
with a greenish cast - underbody  
from legs back grey-white -  
alive green wings & tail - tail deeply  
forked, about  $\frac{1}{2}$  inch or so - females  
there also - pale.

Saw them in several places around  
in woods, also one in back of house  
this eve. about 5:30.

Saw a few white & red-  
breasted nuthatches, going around  
& around the trees. One "reddy"  
was hacking away at the bark  
at the edge of a lichen on an oak.



Many bull-frogs croaking,  
but very poor quality. One, who  
was tuning up for the first  
time probably, sounded like  
a large hen cackling. A large  
slider upon a log in the pond. He  
vacated when he saw me.

Hundreds of small lampreys <sup>going up stream</sup>  
I saw a beautiful fox-  
arrow on this edge of the  
pond. He was very bright &  
very tame. Two bronze creepers  
many titmice, chickadees, etc.

Aphoe which I think was  
probably the same one that's  
been around the house was at  
the pond all the time I was there,  
catching insects almost off the  
surface, and continually  
calling "skew-wet, skew-wet".

I went over towards the falls -  
looked back to the falls  
down pine, and saw two  
little Carolina wrens in

the leaves at its base. I  
looked thru the glasses again  
and saw a small bird  
fly up into a tree. His  
beautiful oval golden rump  
identified him as a  
myrtle warbler. He flew  
about, but when I got there  
later I couldn't find him  
anywhere in the woods.

The marsh was thick  
with song sparrows,  
running on the beaten  
down grass in the edge of  
the grass (marsh or water?)  
7/1/30.

April 4, 1930 - Fri.

That I saw a brown thrasher  
pitch into the little marsh beside  
Walter Kasilip's.

April 5, 1930 - Sat.

This AM. in Occoquan I saw  
Two purple martins flying  
over the river, one swooping

down and getting a drink.  
Saw another one over pond  
this noon. Cal that he saw them  
a week ago but I did not.

Dozens of Kinglets and several  
Pine Warblers in the pine tops by  
the pond.

Hundreds of song sparrows  
and many tree sparrows singing  
& walking in the marsh on the  
dry grass and in the water.

Heard a weak, thin song  
near pond, repeated several  
times at intervals. I couldn't  
locate any singer, but that it  
might have been one of Kinglets  
singing a love song. If so I never  
heard one sing like it before. "Sweet,  
sweet, ~~few~~ few, few, sweet," etc.  
It seemed typical of warblers or  
some birds of their kind.

At falls I heard a pretty  
song and knew it was a ~~chamberlain~~  
After a moment I placed  
it. The Louisiana water thrush,

whom I saw for the first  
time a year ago yesterday,  
was there. After a few moments  
I saw him bobbing among  
the tree tops watching me.  
He walked in the shallow water  
as it went over the tiny falls,  
walked sideways along the  
steep banks, ducking under  
the water for food.

Later the phoebe, who  
has been singing down  
here all morning, dived  
at him as he went back  
under an overhanging  
bank. They sat near each  
other a moment, then phoebe  
flew off & Mr. L. W. Thrush  
went about his business.

Saw long-billed marsh  
wren in marsh about noon.  
One slider out in pond, two  
in marsh. Hundreds of  
Robins. I wish there were  
thousands.



Several hawks and robins on way to Decoquan.

✓ Quite a few flickers in woods.

Heard a jay - bird - first in long time.

Heard sea-gulls screaming & flying out over land for first time (March 29 - Sat)

Sat., April 12, 1930.

✓ A brown thrasher was singing beautifully in the top of the persimmon tree; he put on a special number for me. He was in the bushes when I came back. First definitely seen.

One warbler - black & blotted sides - Gold throat & chest - black cheeks & face - white lores, ol. green or grey back - long bill - two white wing bars & white line over eye - white outer tail feathers.

✓ sang continuously in pines - "which, chirp, chirp, chirp, whist" or notes to that effect - very pretty.

Golden Yellow-Throated Warbler first I've ever seen that I know of.

Several more around in trees.

April 13, 1930 - Sunday.

✓ A Black & white warbler singing - "se - meet, sweet, sweet" sometimes speeding up.

Many chickadees & Flickers, several downy woodpeckers.

About a dozen or more Louisiana water thrushes going thru their courting in the marsh far above the pond. Chase each other about - one limb in a big maple, about 15 feet from ground seemed a favorite. Several would sit on it and walk up & down, bobbing

about, singing & fussing.  
Almost like flickers.  
Darted in & out of large  
rose bush, up & down  
swamp, to fall & back-  
singing & calling all the  
while!

pt.  
8 1/2 ft.  
Snake  
water  
snake

Killed the small snake  
that I that I crept yesterday.  
About 8 got away  
from me, all water  
snakes. My "snake-  
eyes" weren't working &  
I wouldn't see 'em until  
they disappeared in water. Caught  
one 5 faster yesterday.

Took pot shot at 4 ft.  
water snake on bank on this  
side of pond, just as he  
flashed out of sight. Got him coming  
back, although had life enough  
to slip off stick, I'm sure I got  
him.

Saw Brown thrasher

today. Also another Yellow-  
throated Warbler!

Heard the first whi-  
poor - will singing tonight.  
First one last year was April  
3. He's late.

April 19, 1930, Sat.

Coming back from  
Wood Bridge - heard a number  
of <sup>sparrows</sup> rustling in haves - all  
flew away in short pines  
over hill except one -  
very tame - resembled  
very - but kept back  
turned all time so I  
couldn't see chest - seemed  
smaller & slimmer - dark  
brown back - large black  
eyes, long slim bill. Hopped  
& flew from limb to limb,  
but I couldn't identify him.  
Saw about 6 or 8



wild canaries came flying  
north into woods. Lit  
by old cellar. While  
waiting for "Bob" Breanna  
to get a cake I heard several  
X L. Water Thrushes singing  
over in Bubbs marsh, near  
Beards. Several hawks  
X About 6 or 8 around house  
at noon. Saw beds of  
violets across from  
little bridge in hollows -  
so thick they formed a ventral  
carpet - seemed a purple  
haze - Saw several  
X "shunk cabbages" I think -  
X acres of in up railroad track.  
Down in Mc'Mahan's  
X woods saw many Anemones  
or wind flowers, pure white  
X intermingled with a great many  
X lavender, hepaticas or liver-  
worts. The effect was very  
charming. Some seemed to  
come from same bush;  
an old road across from spring.

April 20, 1930 - Sunday -  
Saw Wood Bridge play  
first game of season - beat  
Dumfries 16 to 2 at Dumfries.  
Jeff & Avery pitched.

Phoebe was in woods this  
eve. Kept going pit - pit,  
at intervals. Caught a  
big bug an inch or more  
long. Beat it on one hind  
then on another, & finally  
left part hanging on hind  
X Several myrtle  
warblers around in yard,  
& in woods. Bl. & white  
warblers singing.  
Thrashers in back  
of chicken houses. One  
in woods this A. M. kept  
calling "sow-what, sow-what."  
I answered & he appeared  
interested. Same happened  
to these two & when they  
were in garden, running

across potatoes.

In bushes back of chicken house saw what I thought was a house wren, but instead it must have been a Carolina wren. So dark I couldn't tell for sure.

Several hawks today. Many wild-canaries.

Seagulls screaming tonight. A flock of about 50 ducks went over, headed south, then back over the house & south again. Very low - sounded like strong wind - calling and quacking low and clearly. One went "gagg, quag, quag" directly over house.

Whippoorwill singing tonight as every night, but only for a short while.

Aug. 4-7, 1930 - Heard starling and whippoorwill on garden border, but fence barely possible at house, & the only at house.

April 21, 1930.

Nashville Warbler.  
Vermont Warbler.

April 23, 1930.

Yellow Palm Warbler - first labeled this a Nashville, but see now it couldn't have been.

Dark gold underbody; darker streaks on sides - greenish-gold lower back; and olive-green back and sides - red-brown crown - sang "sa-widdy-widdy-widdy," in a weak voice. Ate an insect. "walked" from limb to limb. Pumped tail.

Louisiana water thrushes singing and hunting.

Indigo and Nerts.

Maryland yellowthroat in tangles.

Purple Finches.

16 to 20 birds - size of canaries. Males deep rose - red on head, neck, and throat, and rump. Backs rose.



underbody gray with a rose-flush.  
Females gray with rose flush.  
Carried on continual chatty-like  
twittering in top of tall oaks. Were  
preening themselves constantly.  
Since they flew in from the  
south, they may have just been  
finishing their night's flight  
and were resting up.

They flew, a few remaining in  
oaks, later following others.

Soon found entire flock  
feeding in a beech tree, eating  
the catkins, flowers or what ever they  
are.

With them were some white-  
throated sparrows which I had a  
terrible time identifying, looking up at  
them from below, and not expecting  
them there. I took these notes:

Larger birds, like chipping sparrows, were  
somewhat in posture, greyish; yellow  
lores; brown tail, forked; snow white  
throat set off by black necklace or line  
shading off. No streaks on grey body.

long tail. white superciliary line.  
Females(?) - heavily spotted underbody;  
white line over eye.

I possibly was getting the females  
confused here, since a bottom view  
does not reveal distinguishing marks.

All of these birds were very tame.  
I left my rifle at the base of the  
tree, climbed up among them, propped  
myself in various positions, examining  
them and taking notes. They fed  
on around me, were paying the  
least attention ~~attention~~ or becoming  
at all frightened. I could not  
manage to get above them, as  
they were then feeding in the top  
of the tree, mainly, by now.

They fed for about an hour  
while I watched them, and  
were still busy when I left.  
The leaves beneath the tree were  
liberally covered with droppings,  
and with parts of flowers dropped.

Nashville Warbler - I have this written down, but saw at the date of copying (Dec. 26, 1930) - I do not know but what I may have meant a Yellow palm Warbler. However this may have been a Nashville. The first one today was a mistake.

No Date - on back of page from April 27, I have made 30 notes. Then the next page has these notes at top, and then April 27 & notes from that day. I remember these dateless notes, taken while on way to road to get paper. Probably only 27, and date was for a second trip, to pond.

Black-throated Green Warbler.

Palm Warbler (Yellow Palm) - sang "sweet-sweet-sweet-few-few."

Pine Warbler

Black & White Warbler

Wilson's Warbler? - looked very much like

Female Bay Breasted - seemed similar perhaps was female Chestnut-sided,

with some chestnut on sides.  
Yellow-Throated Warbler - sang "chee-by-chee-by-chen".  
Prairie Warbler.  
Myrtle Warbler.  
Ruby-Crowned Kinglet - scolded like a wren - "skit-skit-skitt-t-t."

April 27, Sunday.

First House wren of season singing by persimmon tree.

A vireo singing like "Mary-De-la, Come here," as we used to interpret it. Yellow-Thr. - June 13, 1930.

Two Parula Warblers in the top of a tall maple in marsh, singing constantly in their screeching, tinkling way, "wee-wee-wee-zah!"

Six or eight Purple Finches in top of a maple in marsh eating. Remained there all the time I was there. Not very active. Some birds with them as before which I thought might be pine siskins, as they



resembled female Finches but were marked differently below, I've forgotten just how.

Louisiana Water Thrushes in marsh.

Titmice singing their loud cheerful carols!

One woodcock - jumped in marsh.  
One Myrtle Warbler - by pool back up in marsh - near tree with finches. Caught flies right over my head. Flew and darted about from perch to perch, in Alders, or maples, sycamores, etc. Sang constantly a sleepy "whit-whit-chucky, chucky, chucky, chucky."

One brown crane - or heron.

One kingfisher.

April 29, 1930.

Heard a warbler sing at 6:45 P.M. over hill. Heard same warbler singing in pine over hill while coming from train. That at first it was a

yellow warbler, but on better view saw he was a prairie warbler. Sang "zutch-zutch, utch-utch-utch;" very rapid - loud, clear, very queer, airy & flute-like - sort of twanging.

Black & white warblers also.

May 1, 1930.

At Georgetown Md.

Cardinal, English sparrows, starlings, crows, robins, swallows, swifts, chip-sparrows - etc.

Also several wood-thrushes. Many catbirds - first I've seen this season.

Great many yellow warblers - in trees, bushes, everywhere, mainly in upper parts of trees, never still, constantly flitting from place to place.

First of year for me.

Many white-throated sparrows.

All seen on car track back of Biology lab. up to bridge on track. Also in bushes back of lab.

At home - same day.  
Many Chewinks, robins, white-  
throated sparrows and thrashers  
scratching in leaves. A number  
of Flickers. Catbirds.

W. J. H. H. H.  
One warbler sang "whet, whet, you  
parhet" or "sweet-sweet, you sweet,"  
or again "whet, whet, you whety."  
Traveled rapidly. Too dark to see.  
Perhaps a Hooded Warbler? Have seen same  
trait in them several times later in summer.  
Heard whip-poor-will.

Birds late this year - Scarlet  
Tanager, Bee Martin, + Redstarts.

Swifts & Swallows - some  
seen for first time Sat. about two  
weeks ago.

Saw first ticks 2 or 3 weeks ago.

May 2, 1930.

Several Bee Martins or King  
birds here this evening about  
7 o'clock, calling to me, telling me

Snow began arrived at last.

Yellow Warbler in Apple tree  
this A. M., about 6:45.

May 3, 1930.

Redstarts - here at last.

Chestnut-sided Warbler - male.

Black & white Warbler.

Yellow-throated Vireo.

Oven-birds.

Hooded Warblers.

Chewinks.

Myrtle Warblers.

Black-throated Green Warblers.

Yellow-billed Cuckoo.

Summer Tanager.

Hawk

Crow

Prairie Warbler.

White-throated Sparrows.

In the orig. I wrote this in red  
pencil; partly because the pencil  
was hardy, partly because it was  
somewhat of a red-letter day in  
regard to species seen.



May 4, 1930.

1 yellow warbler.

one yellow-throated Vireo eating -

Just Caterpillars in apple trees.

Wood(?) Thrush.

Louisiana Water Thrush

Vireo.

Louisiana Water Thrushes

Male Maryland Yellowthroat.

Another " " " " in  
Shunk Cabbage & brim patch.

Paina Warblers - one in

maple tree, others in around in

woods. Sang constantly "wee-wee-

ee-geah" sleeping, bubbling sound.

3rd. { One 2 1/2 foot water snake.

Snake { Red-eyed(?) Vireo - "cheer-up-where  
is it - cheer up there it is."

Male Redstart.

A number of Black-throated Blue  
Warblers - across logs at falls - in bunch,  
drinking. One high in paws - catching  
insects on wing - picking them off, young  
shoots - running down limb - spreading  
tail like redstart. Indigo Bunting - Carolin

FALL 1926 - 16 squirrels - 3 quail  
1928 - Middle of June - end of July - 17 year  
locusts

Fall & Winter - 1928 - 68 squirrels -

March 1928 - 4 ft. marsh hawk - 83 yds.

Spring 1928 - Baltimore Orioles -

raised 1 young male & 2 females.

Aug. 12, 1928 - 8th snake of season - 6 ft. black.

1927 record - 13 snakes -

1928. - Indigo Buntings - nest  
along path to road.

Aug. 12, 1928 - Steady rain for days lots of  
damage.

Aug 18, 1928 - Rain - Orioles back -

1 hawk, 40 yds - snapping turtle - 1 rabbit.

Aug 19, 1928 - Shot 2 hawks -

Sept. 1, 1928 - 1 squirrel

Sept. 1928 - 1 water snake - total 9 to date.

Oct. 13 or 20 - 1 black snake - total 10 to date.

Oct. 27, 1928 - Crippled 1 squirrel in gum tree;

Killed 1 ~~two~~ rabbit - 1 hawk.

Nov. 1, 1928 -

First white-throated sparrow.

Nov. 28, 1928 - Carolina Wren on path.

Indigo (male).

Redstart here last summer.

Orchard Oriole " " "

Summer Wren " " "

Flocks of five birds - warblers,  
nuthatches, creepers, chickadees,  
& woodpeckers.

Jan. 6, 1929 - Dec. 1, 1928.

1 rabbit near pond. 1 Red Fox  
in Horner's - Fine work by Teddy.  
Luppy was along but got off  
trail.

1 rabbit - caught by Carl first.  
Have killed 10 rabbits, 7/8 squirrels,  
& have seen 3 squirrels.

Sat. Dec. 29, 1928

Chickadees - white-breasted nut-  
hatches on path to road.

Jan. 5, 1929, Sat.

Watched 2 airplanes & sharp-shinned hawk

Jan 19, 1929, Sat.

Bluebirds & starlings singing in  
garden - sparrows, wild-canary,  
& Woodthrush - "late-spring" weather

Thurs, Jan. 24, 1929.

Nuthatches, chickadees, & tit mice

on workhouse road.

Tues. Feb. 5, 1929

Golden-crowned Kinglet on  
road near lower gate.

March 16, 1929, Sat.

About a dog. flickers, the same  
no. of yellow-bellied sapsuckers, 6 or 8  
downy & hairy woodpeckers up by  
castle woods.

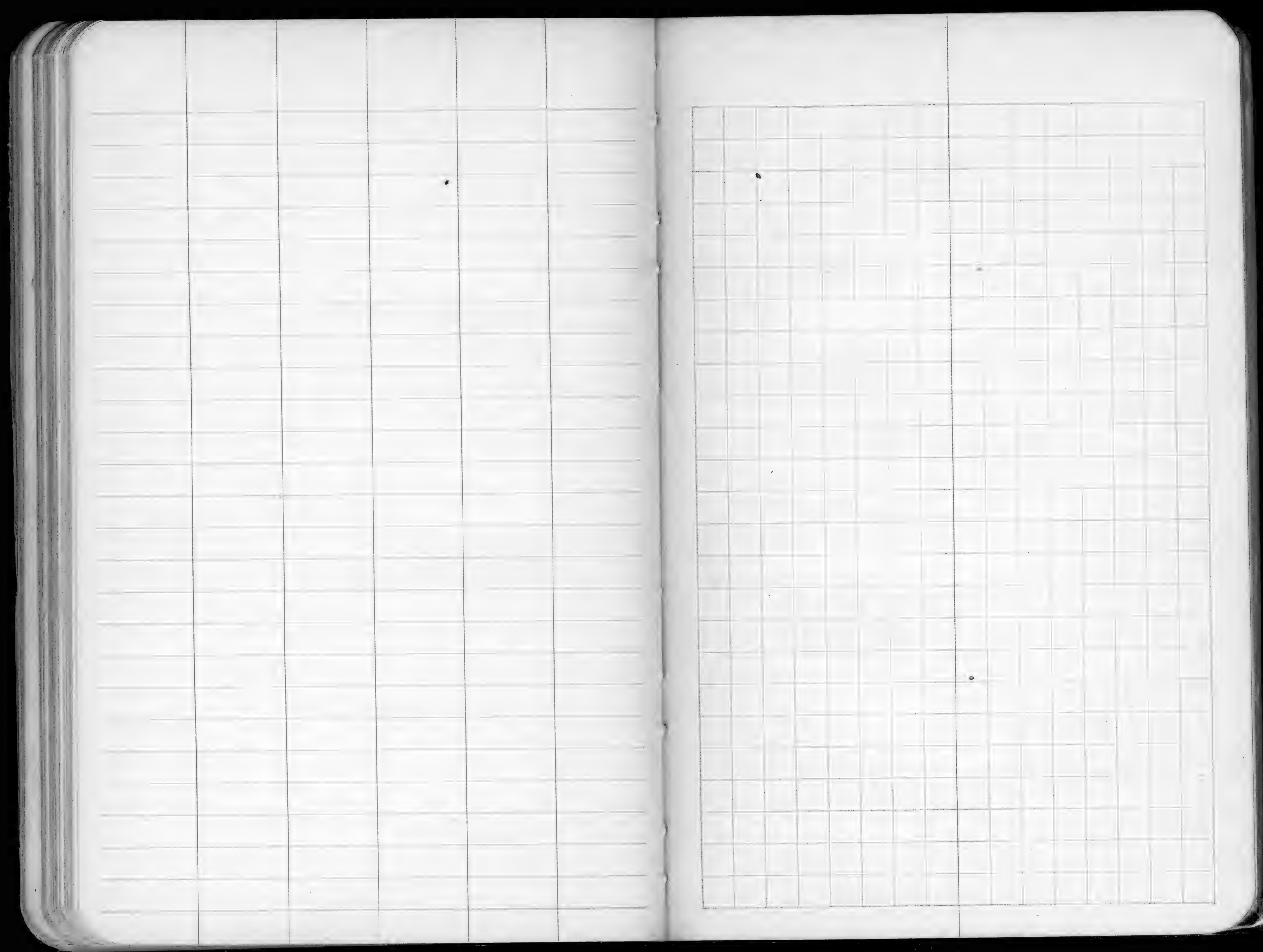
March 17, Sunday.

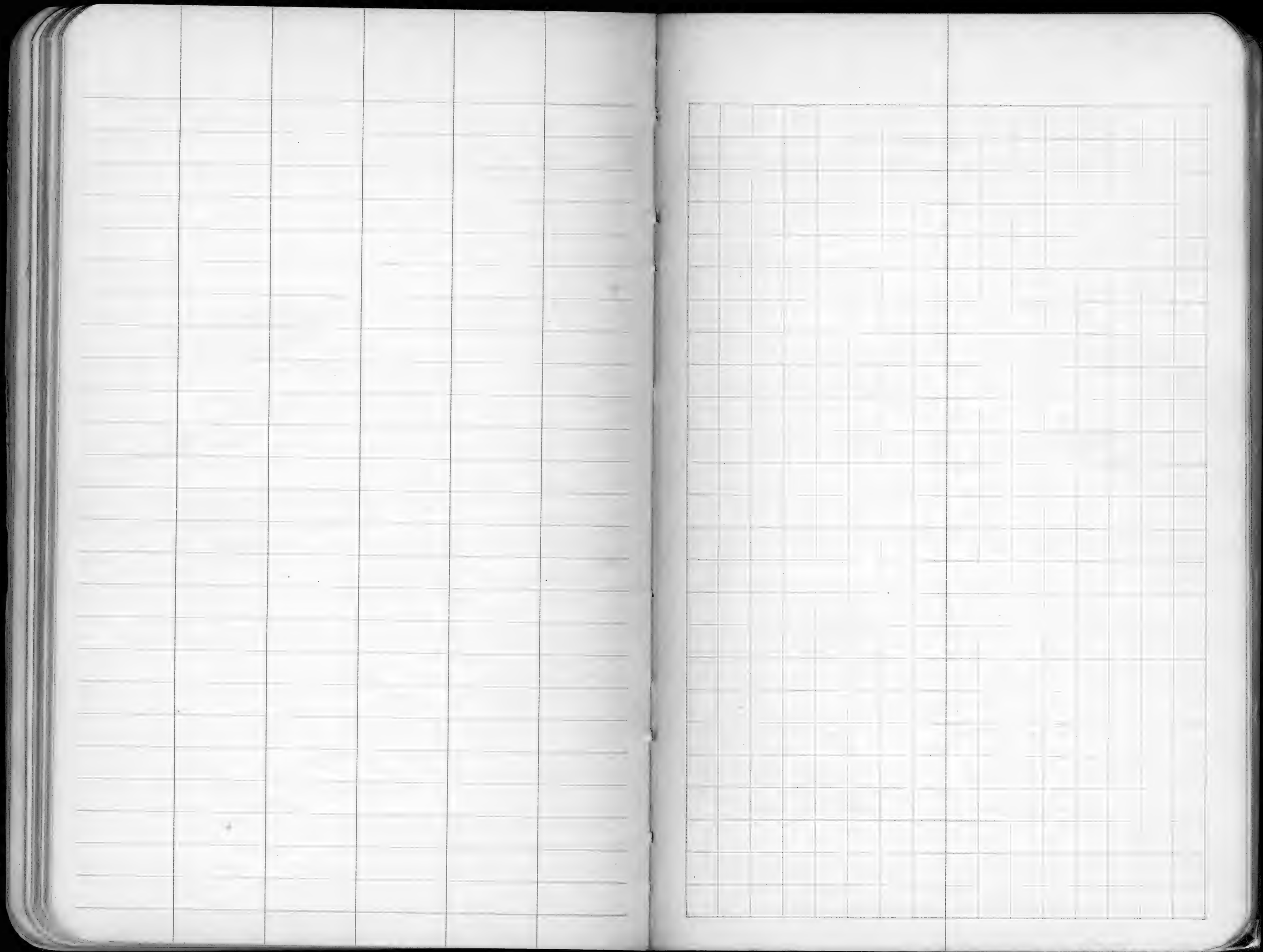
1 sapsucker in yard.

March 23, 1929, Sat.

7 midday - Sparrows, juncos,  
wild canaries & family everywhere  
Blackbirds, jays & flickers at pond.









Month	Trees Blooming	Flower
March	Willow	Soft-silvery-gray catkins
	Elm { White	Drooping catkins - hairy - red
	Slippery	purple - hairy - red
	Aspen - large toothed	Red - hairy - red
	Maple - Silver	Br. bell-shaped
	Maple - Red	Small Red - bell-shaped
	Elder - Box	
	Poplar - Lombardy	
	Bassam	
April	Cottonwood	
	Asp - Quaking	
	Balm of Gilead	
	Poplar - White	
	Maple - Norway	Silky catkins - red -
	Birches (most)	trailing stems, catkins -
	Hornbeam	aff. - light pinkish
	Ash - Blue - purple	
Late	Maple { Sugar	delicate grayish-yellow - hairy - S.
	Sycamore	or. flower clusters
	Oak - Red	
	Ash - Green	

Mo.	Trees
	Oak - Black
	Oak - White
	Beech
	Hickory
	Butternut
MAY	
Most of	Ash { Red
the	White
Trees	Maple - Striped
blooming	Tulip
	Birch - Gray

# KEITH'S RAILROAD CURVE TABLES.

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## HOW TO USE KEITH'S TABLES.

### EXAMPLE.

Wanted a Curve with an Ext. of about 12 ft. Angle  
of Intersection or I. P. =  $23^{\circ} 20'$  to the R. at Station  
542+72.

Ext. in Tab. IV opposite  $23^{\circ} 20' = 120.87$   
 $120.87 \div 12 = 10.07$ . Say a  $10^{\circ}$  Curve.

Tan. in Tab. IV opp.  $23^{\circ} 20' = 1183.1$   
 $1183.1 \div 10 = 118.31$ .

Tab. V correction for A.  $23^{\circ} 20'$  for a  $10^{\circ}$  Cur. = 0.16  
 $118.31 + 0.16 = 118.47 = \text{corrected Tangent}$ .

(If corrected Ext. is required find in same way)  
Ang.  $23^{\circ} 20' = 23.33^{\circ} \div 10 = 2.3333 = \text{L. C.}$

$2^{\circ} 19\frac{1}{2}' = \text{def. for sta.}$	542	I. P. = sta.	542+72
$4^{\circ} 49\frac{1}{2}' = \text{" " "}$	+50	Tan. =	1.18.47
$7^{\circ} 19\frac{1}{2}' = \text{" " "}$	543	B. C. = sta.	541+53.53
$9^{\circ} 49\frac{1}{2}' = \text{" " "}$	+50	L. C. =	2.33.33
$11^{\circ} 40' = \text{" " "}$	543+	E. C. = Sta.	543+86.86
	86.86		

$100 - 53.53 = 46.47 \times 3' (\text{def. for 1 ft. of } 10^{\circ} \text{ Cur.}) = 139.41' =$   
 $2^{\circ} 19\frac{1}{2}' = \text{def. for sta. 542.}$

Def. for 50 ft. =  $2^{\circ} 30'$  for a  $10^{\circ}$  Curve.

Def. for 36.86 ft. =  $1^{\circ} 50\frac{1}{2}'$  for a  $10^{\circ}$  Curve.

(These tables are published in Field Books of  
KEUFFEL & ESSER CO., New York, N. Y.)

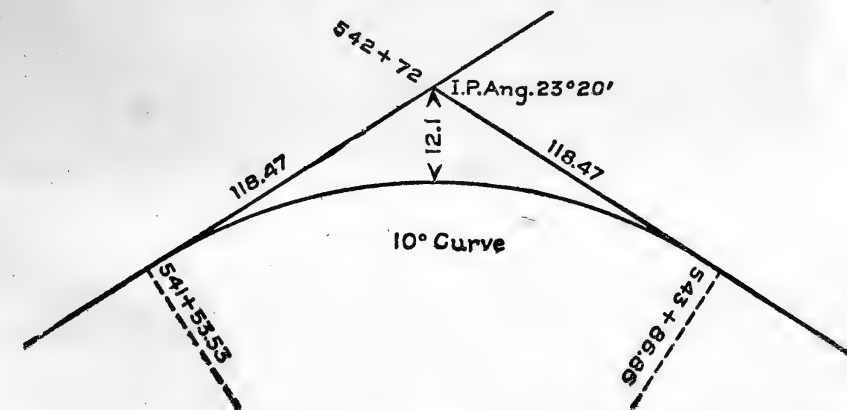




TABLE I. — Minutes in Decimals of a Degree.

1'	.0167	11'	.1833	21'	.3500	31'	.5167	41'	.6833	51'	.8500
2	.0333	12	.2000	22	.3667	32	.5333	42	.7000	52	.8667
3	.0500	13	.2167	23	.3833	33	.5500	43	.7167	53	.8833
4	.0667	14	.2333	24	.4000	34	.5667	44	.7333	54	.9000
5	.0833	15	.2500	25	.4167	35	.5833	45	.7500	55	.9167
6	.1000	16	.2667	26	.4333	36	.6000	46	.7667	56	.9333
7	.1167	17	.2833	27	.4500	37	.6167	47	.7833	57	.9500
8	.1333	18	.3000	28	.4667	38	.6333	48	.8000	58	.9667
9	.1500	19	.3167	29	.4833	39	.6500	49	.8167	59	.9833
10	.1667	20	.3333	30	.5000	40	.6667	50	.8333	60	1.0000

TABLE II. — Inches in Decimals of a Foot.

1-16	3-32	1/8	3-16	1/4	5-16	3/8	1/2	5/8	3/4	7/8
.0052	.0078	.0104	.0156	.0208	.0260	.0313	.0417	.0521	.0625	.0729
1	2	3	4	5	6	7	8	9	10	11
.0833	.1667	.2500	.3333	.4167	.5000	.5833	.6667	.7500	.8333	.9167

TABLE III. — Radii, Ordinates and Deflections.

Deg.	Radius	Mid. Ord.	Tan. Def.	Chd. Def.	Def. for 1 Foot	Deg.	Radius	Mid. Ord.	Tan. Def.	Chd. Def.	Def. for 1 Foot
0° 10'	34377.	.036	.145	.291	0.05'	7°	819.0	1.528	6.105	12.21	2.10'
20	17189.	.073	.291	.582	0.10	20'	781.8	1.600	6.395	12.79	2.20
30	11459.	.109	.436	.873	0.15	30	764.5	1.637	6.540	13.08	2.25
40	8594.4	.145	.582	1.164	0.20	40	747.9	1.673	6.685	13.37	2.30
50	6875.5	.182	.727	1.454	0.25	50	716.8	1.746	6.976	13.95	2.40
1 10	5729.6	.218	.873	1.745	0.30	60	688.2	1.819	7.266	14.53	2.50
20	4911.2	.255	1.018	2.036	0.35	70	674.7	1.855	7.411	14.82	2.55
30	4297.3	.291	1.164	2.327	0.40	80	661.7	1.892	7.556	15.11	2.60
40	3819.8	.327	1.309	2.618	0.45	90	637.3	1.965	7.846	15.69	2.70
50	3437.9	.364	1.454	2.909	0.50	100	614.6	2.037	8.136	16.27	2.80
2 10	3125.4	.400	1.600	3.200	0.55	110	603.8	2.074	8.281	16.56	2.85
20	2864.9	.436	1.745	3.490	0.60	120	593.4	2.110	8.426	16.85	2.90
30	2644.6	.473	1.891	3.781	0.65	130	573.7	2.183	8.716	17.43	3.00
40	2455.7	.509	2.036	4.072	0.70	140	546.4	2.292	9.150	18.30	3.15
50	2292.0	.545	2.181	4.363	0.75	150	521.7	2.402	9.585	19.16	3.30
3 10	2148.8	.582	2.327	4.654	0.80	160	499.1	2.511	10.02	20.04	3.45
20	2022.4	.618	2.472	4.945	0.85	170	478.3	2.620	10.45	20.91	3.60
30	1910.1	.655	2.618	5.235	0.90	180	459.3	2.730	10.89	21.77	3.75
40	1809.6	.691	2.763	5.526	0.95	190	441.7	2.839	11.32	22.64	3.90
50	1719.1	.727	2.908	5.817	1.00	200	425.4	2.949	11.75	23.51	4.05
4 10	1637.3	.764	3.054	6.108	1.05	210	410.3	3.058	12.18	24.37	4.20
20	1562.9	.800	3.199	6.398	1.10	220	396.2	3.168	12.62	25.24	4.35
30	1495.0	.836	3.345	6.689	1.15	230	383.1	3.277	13.05	26.11	4.50
40	1432.7	.873	3.490	6.980	1.20	240	370.8	3.387	13.49	26.97	4.65
50	1375.4	.909	3.635	7.271	1.25	250	359.3	3.496	13.92	27.84	4.80
5 10	1322.5	.945	3.718	7.561	1.30	260	348.5	3.606	14.35	28.70	4.95
20	1273.6	.982	3.926	7.852	1.35	270	338.3	3.716	14.78	29.56	5.10
30	1228.1	1.018	4.071	8.143	1.40	280	319.6	3.935	15.64	31.29	5.40
40	1185.8	1.055	4.217	8.433	1.45	290	302.9	4.155	16.51	33.01	5.70
50	1146.3	1.091	4.362	8.724	1.50	300	287.9	4.374	17.37	34.73	6.00
6 10	1109.3	1.127	4.507	9.014	1.55	310	274.4	4.594	18.22	36.44	6.30
20	1074.7	1.164	4.653	9.305	1.60	320	262.0	4.814	19.08	38.16	6.60
30	1042.1	1.200	4.798	9.596	1.65	330	250.8	5.035	19.94	39.87	6.90
40	1011.5	1.237	4.943	9.886	1.70	340	240.5	5.255	20.79	41.58	7.20
50	982.6	1.273	5.088	10.18	1.75	350	231.0	5.476	21.64	43.28	7.50
7 10	955.4	1.309	5.234	10.47	1.80	360	222.3	5.697	22.50	44.99	7.80
20	929.6	1.346	5.379	10.76	1.85	370	214.2	5.918	23.35	46.69	8.10
30	905.1	1.382	5.524	11.05	1.90	380	206.7	6.139	24.19	48.38	8.40
40	881.9	1.418	5.669	11.34	1.95	390	199.7	6.360	25.04	50.07	8.70
50	859.9	1.455	5.814	11.63	2.00	400	193.2	6.583	25.88	51.76	9.00

TABLE IV. — Tangents and Externals to a 1° Curve.

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
1°	50.00	.22	11°	551.70	26.50	21°	1061.9	97.57
10'	58.34	.30	10'	560.11	27.31	10'	1070.6	99.16
20	66.67	.39	20	568.53	28.14	20	1079.2	100.75
30	75.01	.49	30	576.95	28.97	30	1087.8	102.35
40	83.34	.61	40	585.36	29.82	40	1096.4	103.97
50	91.68	.73	50	593.79	30.68	50	1105.1	105.60
2	100.01	.87	12	602.21	31.56	22	1113.7	107.24
10	108.35	1.02	10	610.64	32.45	10	1122.4	108.90
20	116.68	1.19	20	619.07	33.35	20	1131.0	110.57
30	125.02	1.36	30	627.50	34.26	30	1139.7	112.25
40	133.36	1.55	40	635.93	35.18	40	1148.4	113.95
50	141.70	1.75	50	644.37	36.12	50	1157.0	115.66
3	150.04	1.96	13	652.81	37.07	23	1165.7	117.38
10	158.38	2.19	10	661.25	38.03	10	1174.4	119.12
20	166.72	2.43	20	669.70	39.01	20	1183.1	120.87
30	175.06	2.67	30	678.15	39.99	30	1191.8	122.63
40	183.40	2.93	40	686.60	40.99	40	1200.5	124.41
50	191.74	3.21	50	695.06	42.00	50	1209.2	126.20
4	200.08	3.49	14	703.51	43.03	24	1217.9	128.00
10	208.43	3.79	10	711.97	44.07	10	1226.6	129.82
20	216.77	4.10	20	720.44	45.12	20	1235.3	131.65
30	225.12	4.42	30	728.90	46.18	30	1244.0	133.50
40	233.47	4.76	40	737.37	47.25	40	1252.8	135.35
50	241.81	5.10	50	745.85	48.34	50	1261.5	137.23
5	250.16	5.46	15	754.32	49.44	25	1270.2	139.11
10	258.51	5.83	10	762.80	50.55	10	1279.0	141.01
20	266.86	6.21	20	771.29	51.68	20	1287.7	142.93
30	275.21	6.61	30	779.77	52.89	30	1296.5	144.85
40	283.57	7.01	40	788.26	53.97	40	1305.3	146.79
50	291.92	7.43	50	796.75	55.13	50	1314.0	148.75
6	300.28	7.86	16	805.25	56.31	26	1322.8	150.71
10	308.64	8.31	10	813.75	57.50	10	1331.6	152.69
20	316.99	8.76	20	822.25	58.70	20	1340.4	154.69
30	325.35	9.23	30	830.76	59.91	30	1349.2	156.70
40	333.71	9.71	40	839.27	61.14	40	1358.0	158.72
50	342.08	10.20	50	847.78	62.38	50	1366.8	160.76
7	350.44	10.71	17	856.30	63.63	27	1375.6	162.81
10	358.81	11.22	10	864.82	64.90	10	1384.4	164.86
20	367.17	11.75	20	873.35	66.18	20	1393.2	166.95
30	375.54	12.29	30	881.88	67.47	30	1402.0	169.04
40	383.91	12.85	40	890.41	68.77	40	1410.9	171.15
50	392.28	13.41	50	898.95	70.09	50	1419.7	173.27
8	400.66	13.99	18	907.49	71.42	28	1428.6	175.41
10	409.03	14.58	10	916.03	72.76	10	1437.4	177.55
20	417.41	15.18	20	924.58	74.12	20	1446.3	179.72
30	425.79	15.80	30	933.13	75.49	30	1455.1	181.89
40	434.17	16.43	40	941.69	76.86	40	1464.0	184.08
50	442.55	17.07	50	950.25	78.26	50	1472.9	186.29
9	450.93	17.72	19	958.81	79.67	29	1481.8	188.51
10	459.32	18.38	10	967.38	81.09	10	1490.7	190.74
20	467.71	19.06	20	975.96	82.53	20	1499.6	192.99
30	476.10	19.75	30	984.53	83.97	30	1508.5	195.25
40	484.49	20.45	40	993.12	85.43	40	1517.4	197.53
50	492.88	21.16	50	1001.7	86.90	50	1526.3	199.82
10	501.28	21.89	20	1010.3	88.39	30	1535.3	202.12
10	509.68	22.62	10	1018.9	89.89	10	1544.2	204.44
20	518.08	23.38	20	1027.5	91.40	20	1553.1	206.77
30	526.48	24.14	30	1036.1	92.92	30	1562.1	209.12
40	534.89	24.91	40	1044.7	94.46	40	1571.0	211.48
50	543.29	25.70	50	1053.3	96.01	50	1580.0	213.86

TABLE IV. — Tangents and External to a 1° Curve.

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
<b>31°</b>	1589.0	216.3	<b>41°</b>	2142.2	387.4	<b>51°</b>	2732.9	618.4
10'	1598.0	218.7	10'	2151.7	390.7	10'	2743.1	622.8
20	1606.9	221.1	20	2161.2	394.1	20	2753.4	627.2
30	1615.9	223.5	30	2170.8	397.4	30	2763.7	631.7
40	1624.9	226.0	40	2180.3	400.8	40	2773.9	636.2
50	1633.9	228.4	50	2189.9	404.2	50	2784.2	640.7
<b>32</b>	1643.0	230.9	<b>42</b>	2199.4	407.6	<b>52</b>	2794.5	645.2
10	1652.0	233.4	10	2209.0	411.1	10	2804.9	649.7
20	1661.0	235.9	20	2218.6	414.5	20	2815.2	654.3
30	1670.0	238.4	30	2228.1	418.0	30	2825.6	658.8
40	1679.1	241.0	40	2237.7	421.4	40	2835.9	663.4
50	1688.1	243.5	50	2247.3	425.0	50	2846.3	668.0
<b>33</b>	1697.2	246.1	<b>43</b>	2257.0	428.5	<b>53</b>	2856.7	672.7
10	1706.3	248.7	10	2266.6	432.0	10	2867.1	677.3
20	1715.3	251.3	20	2276.2	435.6	20	2877.5	682.0
30	1724.4	253.9	30	2285.9	439.2	30	2888.0	686.7
40	1733.5	256.5	40	2295.6	442.8	40	2898.4	691.4
50	1742.6	259.1	50	2305.2	446.4	50	2908.9	696.1
<b>34</b>	1751.7	261.8	<b>44</b>	2314.9	450.0	<b>54</b>	2919.4	700.9
10	1760.8	264.5	10	2324.6	453.6	10	2929.9	705.7
20	1770.0	267.2	20	2334.3	457.3	20	2940.4	710.5
30	1779.1	269.9	30	2344.1	461.0	30	2951.0	715.3
40	1788.2	272.6	40	2353.8	464.6	40	2961.5	720.1
50	1797.4	275.3	50	2363.5	468.4	50	2972.1	725.0
<b>35</b>	1806.6	278.1	<b>45</b>	2373.3	472.1	<b>55</b>	2982.7	729.9
10	1815.7	280.8	10	2383.1	475.8	10	2993.3	734.8
20	1824.9	283.6	20	2392.8	479.6	20	3003.9	739.7
30	1834.1	286.4	30	2402.6	483.8	30	3014.5	744.6
40	1843.3	289.2	40	2412.4	487.2	40	3025.2	749.6
50	1852.5	292.0	50	2422.3	491.0	50	3035.8	754.6
<b>36</b>	1861.7	294.9	<b>46</b>	2432.1	494.8	<b>56</b>	3046.5	759.6
10	1870.9	297.7	10	2441.9	498.7	10	3057.2	764.6
20	1880.1	300.6	20	2451.8	502.5	20	3067.9	769.7
30	1889.4	303.5	30	2461.7	506.4	30	3078.7	774.7
40	1898.6	306.4	40	2471.5	510.3	40	3089.4	779.8
50	1907.9	309.3	50	2481.4	514.3	50	3100.2	784.9
<b>37</b>	1917.1	312.2	<b>47</b>	2491.3	518.2	<b>57</b>	3110.9	790.1
10	1926.4	315.2	10	2501.2	522.2	10	3121.7	795.2
20	1935.7	318.1	20	2511.2	526.1	20	3132.6	800.4
30	1945.0	321.1	30	2521.1	530.1	30	3143.4	805.6
40	1954.3	324.1	40	2531.1	534.2	40	3154.2	810.9
50	1963.6	327.1	50	2541.0	538.2	50	3165.1	816.1
<b>38</b>	1972.9	330.2	<b>48</b>	2551.0	542.2	<b>58</b>	3176.0	821.4
10	1982.2	333.2	10	2561.0	546.3	10	3186.9	826.7
20	1991.5	336.3	20	2571.0	550.4	20	3197.8	832.0
30	2000.9	339.3	30	2581.0	554.5	30	3208.8	837.3
40	2010.2	342.4	40	2591.0	558.6	40	3219.7	842.7
50	2019.6	345.5	50	2601.1	562.8	50	3230.7	848.1
<b>39</b>	2029.0	348.6	<b>49</b>	2611.2	566.9	<b>59</b>	3241.7	853.5
10	2038.4	351.8	10	2621.2	571.1	10	3252.7	858.9
20	2047.8	354.9	20	2631.3	575.3	20	3263.7	864.3
30	2057.2	358.1	30	2641.4	579.5	30	3274.8	869.8
40	2066.6	361.3	40	2651.5	583.8	40	3285.8	875.3
50	2076.0	364.5	50	2661.6	588.0	50	3296.9	880.8
<b>40</b>	2085.4	367.7	<b>50</b>	2671.8	592.3	<b>60</b>	3308.0	886.4
10	2094.9	371.0	10	2681.9	596.6	10	3319.1	892.0
20	2104.3	374.2	20	2692.1	600.9	20	3330.3	897.5
30	2113.8	377.5	30	2702.3	605.3	30	3341.4	903.2
40	2123.3	380.8	40	2712.5	609.6	40	3352.6	908.8
50	2132.7	384.1	50	2722.7	614.0	50	3363.8	914.5

TABLE IV. — Tangents and External to a 1° Curve.

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
<b>61°</b>	3375.0	920.2	<b>71°</b>	4086.9	1308.2	<b>81°</b>	4893.6	1805.3
10'	3386.3	925.9	10'	4099.5	1315.6	10'	4908.0	1814.7
20	3397.5	931.6	20	4112.1	1322.9	20	4922.5	1824.1
30	3408.8	937.3	30	4124.8	1330.3	30	4937.0	1833.6
40	3420.1	943.1	40	4137.4	1337.7	40	4951.5	1843.1
50	3431.4	948.9	50	4150.1	1345.1	50	4966.1	1852.6
<b>62</b>	3442.7	954.8	<b>72</b>	4162.8	1352.6	<b>82</b>	4980.7	1862.2
10	3454.1	960.6	10	4175.6	1360.1	10	4995.4	1871.8
20	3465.4	966.5	20	4188.5	1367.6	20	5010.0	1881.5
30	3476.8	972.4	30	4201.2	1375.2	30	5024.8	1891.2
40	3488.3	978.3	40	4214.0	1382.8	40	5039.5	1900.9
50	3499.7	984.3	50	4226.8	1390.4	50	5054.3	1910.7
<b>63</b>	3511.1	990.2	<b>73</b>	4239.7	1398.0	<b>83</b>	5069.2	1920.5
10	3522.6	996.2	10	4252.6	1405.7	10	5084.0	1930.4
20	3534.1	1002.3	20	4265.6	1413.5	20	5099.0	1940.2
30	3545.6	1008.3	30	4278.5	1421.2	30	5113.9	1950.3
40	3557.2	1014.4	40	4291.5	1429.0	40	5128.9	1960.2
50	3568.7	1020.5	50	4304.6	1436.8	50	5143.9	1970.3
<b>64</b>	3580.3	1026.6	<b>74</b>	4317.6	1444.6	<b>84</b>	5159.0	1980.4
10	3591.9	1032.8	10	4330.7	1452.5	10	5174.1	1990.5
20	3603.5	1039.0	20	4343.8	1460.4	20	5189.3	2000.6
30	3615.1	1045.2	30	4356.9	1468.4	30	5204.4	2010.8
40	3626.8	1051.4	40	4370.1	1476.4	40	5219.7	2021.1
50	3638.5	1057.7	50	4383.3	1484.4	50	5234.9	2031.4
<b>65</b>	3650.2	1063.9	<b>75</b>	4396.5	1492.4	<b>85</b>	5250.3	2041.7
10	3661.9	1070.2	10	4409.8	1500.5	10	5265.6	2052.1
20	3673.7	1076.6	20	4423.1	1508.6	20	5281.0	2062.5
30	3685.4	1082.9	30	4436.4	1516.7	30	5296.4	2073.0
40	3697.2	1089.3	40	4449.7	1524.9	40	5311.9	2083.5
50	3709.0	1095.7	50	4463.1	1533.1	50	5327.4	2094.1
<b>66</b>	3720.9	1102.2	<b>76</b>	4476.5	1541.4	<b>86</b>	5343.0	2104.7
10	3732.7	1108.6	10	4489.9	1549.7	10	5358.6	2115.3
20	3744.6	1115.1	20	4503.4	1558.0	20	5374.2	2126.0
30	3756.5	1121.7	30	4516.9	1566.3	30	5389.9	2136.7
40	3768.5	1128.2	40	4530.4	1574.7	40	5405.6	2147.5
50	3780.4	1134.8	50	4544.0	1583.1	50	5421.4	2158.4
<b>67</b>	3792.4	1141.4	<b>77</b>	4557.6	1591.6	<b>87</b>	5437.2	2169.2
10	3804.4	1148.0	10	4571.2	1600.1	10	5453.1	2180.2
20	3816.4	1154.7	20	4584.8	1608.6	20	5469.0	2191.1
30	3828.4	1161.3	30	4598.5	1617.1	30	5484.9	2202.2
40	3840.5	1168.1	40	4612.2	1625.7	40	5500.9	2213.2
50	3852.6	1174.8	50	4626.0	1634.4	50	5517.0	2224.3
<b>68</b>	3864.7	1181.6	<b>78</b>	4639.8	1643.0	<b>88</b>	5533.1	2235.5
10	3876.8	1188.4	10	4653.6	1651.7	10	5549.2	2246.7
20	3889.0	1195.2	20	4667.4	1660.5	20	5565.4	2258.0
30	3901.2	1202.0	30	4681.3	1669.2	30	5581.6	2269.3
40	3913.4	1208.9	40	4695.2	1678.1	40	5597.8	2280.6
50	3925.6	1215.8	50	4709.2	1686.9	50	5614.2	2292.0
<b>69</b>	3937.9	1222.7	<b>79</b>	4723.2	1695.8	<b>89</b>	5630.5	2303.5
10	3950.2	1229.7	10	4737.2	1704.7	10	5646.9	2315.0
20	3962.5	1236.7	20	4751.2	1713.7	20	5663.4	2326.6
30	3974.8	1243.7	30	4765.3	1722.7	30	5679.9	2338.2
40	3987.2	1250.8	40	4779.4	1731.7	40	5696.4	2349.8
50	3999.5	1257.9	50	4793.6	1740.8	50	5713.0	2361.5
<b>70</b>	4011.9	1265.0	<b>80</b>	4807.7	1749.9	<b>90</b>	5729.7	2373.3
10	4024.4	1272.1	10	4822.0	1759.0	10	5746.3	2385.1
20	4036.8	1279.3	20	4836.2	1768.2	20	5763.1	2397.0
30	4049.3	1286.5	30	4850.5	1777.4	30	5779.9	2408.9
40	4061.8	1293.6	40	4864.8	1786.7	40	5796.7	2420.9
50	4074.4	1300.9	50	4879.2	1796.0	50	5813.6	2432.9



TABLE IV. — Tangents and External to a 1° Curve.

Angle	Tangent	External	Angle	Tangent	External	Angle	Tangent	External
<b>91°</b>	5830.5	2444.9	<b>101°</b>	6950.6	3278.1	<b>111°</b>	8336.7	4386.1
10'	5847.5	2457.1	10'	6971.3	3294.1	10'	8362.7	4407.6
20	5864.6	2469.3	20	6992.0	3310.1	20	8388.9	4429.2
30	5881.7	2481.5	30	7012.7	3326.1	20	8415.1	4450.9
40	5898.8	2493.8	40	7033.6	3342.3	40	8441.5	4472.7
50	5916.0	2506.1	50	7054.5	3358.5	50	8468.0	4494.6
<b>92°</b>	5933.2	2518.5	<b>102°</b>	7075.5	3374.9	<b>112°</b>	8494.6	4516.6
10	5950.5	2531.0	10	7096.6	3391.2	10	8521.3	4538.8
20	5967.9	2543.5	20	7117.8	3407.7	20	8548.1	4561.1
30	5985.3	2556.0	30	7139.0	3424.3	30	8575.0	4583.4
40	6002.7	2568.6	40	7160.3	3440.9	40	8602.1	4606.0
50	6020.2	2581.3	50	7181.7	3457.6	50	8629.3	4628.6
<b>93°</b>	6037.8	2594.0	<b>103°</b>	7203.2	3474.4	<b>113°</b>	8656.6	4651.3
10	6055.4	2606.8	10	7224.7	3491.3	10	8684.0	4674.2
20	6073.1	2619.7	20	7246.3	3508.2	20	8711.5	4697.2
30	6090.8	2632.6	30	7268.0	3525.2	30	8739.2	4720.3
40	6108.6	2645.5	40	7289.8	3542.4	40	8767.0	4743.6
50	6126.4	2658.5	50	7311.7	3559.6	50	8794.9	4766.9
<b>94°</b>	6144.3	2671.6	<b>104°</b>	7333.6	3576.8	<b>114°</b>	8822.9	4790.4
10	6162.6	2684.7	10	7355.6	3594.2	10	8851.0	4814.1
20	6180.2	2697.9	20	7377.8	3611.7	20	8879.3	4837.8
30	6198.3	2711.2	30	7399.9	3629.2	30	8907.7	4861.7
40	6216.4	2724.5	40	7422.2	3646.8	40	8936.3	4885.7
50	6234.6	2737.9	50	7444.6	3664.5	50	8965.0	4909.9
<b>95°</b>	6252.8	2751.3	<b>105°</b>	7467.0	3682.3	<b>115°</b>	8993.8	4934.1
10	6271.1	2764.8	10	7489.6	3700.2	10	9022.7	4958.6
20	6289.4	2778.3	20	7512.2	3718.2	20	9051.7	4983.1
30	6307.9	2792.0	30	7534.9	3736.2	30	9080.9	5007.8
40	6326.3	2805.6	40	7557.7	3754.4	40	9110.3	5032.6
50	6344.8	2819.4	50	7580.5	3772.6	50	9139.8	5057.6
<b>96°</b>	6363.4	2833.2	<b>106°</b>	7603.5	3791.0	<b>116°</b>	9169.4	5082.7
10	6382.1	2847.0	10	7626.6	3809.4	10	9199.1	5107.9
20	6400.8	2861.0	20	7649.7	3827.9	20	9229.0	5133.3
30	6419.5	2875.0	30	7672.9	3846.5	30	9259.0	5158.8
40	6438.4	2889.0	40	7696.3	3865.2	40	9289.2	5184.5
50	6457.3	2903.1	50	7719.7	3884.0	50	9319.5	5210.3
<b>97°</b>	6476.2	2917.3	<b>107°</b>	7743.2	3902.9	<b>117°</b>	9349.9	5236.2
10	6495.2	2931.6	10	7766.8	3921.9	10	9380.5	5262.3
20	6514.3	2945.9	20	7790.5	3940.9	20	9411.3	5288.6
30	6533.4	2960.3	30	7814.3	3960.1	30	9442.2	5315.0
40	6552.6	2974.7	40	7838.1	3979.4	40	9473.2	5341.5
50	6571.9	2989.2	50	7862.1	3998.7	50	9504.4	5368.2
<b>98°</b>	6591.2	3003.8	<b>108°</b>	7886.2	4018.2	<b>118°</b>	9535.7	5395.1
10	6610.6	3018.4	10	7910.4	4037.8	10	9567.2	5422.1
20	6630.1	3033.1	20	7934.6	4057.4	20	9598.9	5449.2
30	6649.6	3047.9	30	7959.0	4077.2	30	9630.7	5476.5
40	6669.2	3062.8	40	7983.5	4097.1	40	9662.6	5504.0
50	6688.8	3077.7	50	8008.0	4117.0	50	9694.7	5531.7
<b>99°</b>	6708.6	3092.7	<b>109°</b>	8032.7	4137.1	<b>119°</b>	9727.0	5559.4
10	6728.4	3107.7	10	8057.4	4157.3	10	9759.4	5587.4
20	6748.2	3122.9	20	8082.3	4177.5	20	9792.0	5615.5
30	6768.1	3138.1	30	8107.3	4197.9	30	9824.8	5643.8
40	6788.1	3153.3	40	8132.3	4218.4	40	9857.7	5672.3
50	6808.2	3168.7	50	8157.5	4239.0	50	9890.8	5700.9
<b>100°</b>	6828.3	3184.1	<b>110°</b>	8182.8	4259.7	<b>120°</b>	9924.0	5729.7
10	6848.5	3199.6	10	8208.2	4280.5	10	9957.5	5758.6
20	6868.8	3215.1	20	8233.7	4301.4	20	9991.0	5787.7
30	6889.2	3230.8	30	8259.3	4322.4	30	10025.0	5817.0
40	6909.6	3246.5	40	8285.0	4343.6	40	10059.0	5846.5
50	6930.1	3262.3	50	8310.8	4364.8	50	10093.0	5876.1

TABLE V. Corrections for use with Table IV.

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## For Tangents Add

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.03	.06	.09	.13	.16	.19	.22	.25	.28	.31	.34	.38	.42	.46
15°	.04	.10	.14	.19	.24	.29	.34	.39	.45	.51	.53	.58	.63	.68
20°	.06	.13	.19	.26	.32	.39	.45	.51	.58	.65	.72	.79	.84	.90
25°	.08	.16	.24	.33	.40	.49	.58	.67	.75	.83	.90	.99	1.06	1.14
30°	.10	.19	.29	.39	.49	.59	.69	.79	.89	.99	1.09	1.20	1.29	1.39
35°	.11	.22	.34	.47	.58	.69	.70	.81	.92	1.04	1.29	1.42	1.54	1.66
40°	.13	.26	.40	.53	.67	.80	.93	1.06	1.20	1.34	1.49	1.64	1.79	1.94
45°	.15	.30	.44	.60	.76	.91	1.06	1.21	1.37	1.52	1.70	1.87	2.04	2.21
50°	.17	.34	.51	.68	.85	1.02	1.19	1.36	1.54	1.72	1.91	2.10	2.29	2.48
55°	.19	.38	.57	.76	.95	1.14	1.32	1.52	1.72	1.92	2.14	2.35	2.56	2.77
60°	.21	.42	.63	.84	1.05	1.27	1.49	1.71	1.94	2.17	2.38	2.60	2.83	3.07
65°	.23	.46	.69	.93	1.16	1.40	1.64	1.88	2.13	2.38	2.63	2.88	3.13	3.39
70°	.25	.51	.76	1.02	1.28	1.54	1.80	2.06	2.33	2.60	2.88	3.16	3.44	3.72
75°	.27	.56	.83	1.12	1.40	1.69	1.98	2.27	2.57	2.87	3.16	3.47	3.78	4.09
80°	.30	.61	.91	1.22	1.53	1.84	2.15	2.46	2.78	3.10	3.44	3.78	4.12	4.46
85°	.33	.66	1.00	1.33	1.68	2.02	2.36	2.70	3.05	3.40	3.77	4.14	4.55	4.89
90°	.36	.72	1.09	1.45	1.83	2.20	2.57	2.94	3.32	3.70	4.10	4.50	4.91	5.32
95°	.39	.79	1.19	1.55	2.00	2.40	2.80	3.20	3.61	4.02	4.49	4.98	5.38	5.83
100°	.43	.86	1.30	1.74	2.18	2.62	3.06	3.50	3.95	4.40	4.88	5.37	5.85	6.34

## For External Add

Int. Angle	Curve 5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
10°	.001	.003	.004	.006	.007	.008	.009	.011	.012	.014	.015	.017	.018	.020
15°	.003	.007	.010	.014	.018	.023	.027	.029	.032	.035	.039	.043	.047	.051
20°	.006	.011	.017	.022	.028	.034	.038	.045	.051	.057	.063	.070	.076	.083
25°	.009	.018	.027	.036	.046	.056	.065	.074	.083	.093	.106	.120	.127	.135
30°	.013	.025	.038	.051	.065	.078	.090	.103	.116	.129	.149	.170	.179	.188
35°	.018	.035	.054	.072	.086	.109	.131	.153	.175	.197	.213	.230	.247	.264
40°	.023	.046	.070	.093	.117	.141	.172	.203	.234	.265	.277	.290	.315	.341
45°	.030	.060	.093	.119	.153	.184	.216	.254	.289	.325	.351	.378	.411	.445
50°	.037	.075	.116	.151	.189	.227	.266	.305	.345	.384	.425	.467	.508	.550
55°	.046	.093	.142	.188	.236	.283	.332	.381	.420	.479	.530	.582	.641	.700
60°	.056	.112	.168	.225	.283	.340	.398	.457	.516	.575	.636	.697	.774	.851
65°	.067	.135	.204	.273	.343	.412	.483	.554	.625	.697	.771	.845	.922	1.01
70°	.080	.159	.240	.321	.403	.485	.568	.652	.735	.819	.906	.994	1.08	1.17
75°	.095	.182	.286	.383	.480	.578	.678	.777	.877	.977	1.07	1.18	1.29	1.39
80°	.110	.220	.332	.445	.558	.671	.787	.903	1.02	1.13	1.25	1.38	1.50	1.62
85°	.128	.259	.391	.524	.657	.790	.926	1.06	1.20	1.34	1.47	1.62	1.76	1.91
90°	.149	.299	.450	.603	.756	.910	1.07	1.22	1.38	1.54	1.70	1.87	2.03	2.20
95°	.174	.350	.522	.706	.885	1.06	1.25	1.43	1.62	1.80	1.99	2.18	2.38	2.58
100°	.200	.401	.604	.809	1.01	1.22	1.43	1.64	1.85	2.06	2.28	2.50	2.73	2.96

TABLE VI. Deflections for Sub Chords for Short Radius Curves.

Degree of Curve	Radius 50 sin. def. ang.	$\frac{1}{2}$ sub chord R = sin of def. angle				Length of arc for 100 ft.
		12.5 Ft.	15 Ft.	20 Ft.	25 Ft.	
30°	193.18	1° 51'	2° 17'	2° 58'	3° 43'	101.15
32°	181.39	1° 59'	2° 25'	3° 10'	3° 58'	101.33
34°	171.01	2° 06'	2° 33'	3° 21'	4° 12'	101.48
36°	161.80	2° 13'	2° 41'	3° 33'	4° 26'	101.66
38°	153.58	2° 20'	2° 49'	3° 44'	4° 40'	101.85
40°	146.19	2° 27'	2° 57'	3° 55'	4° 54'	102.06
42°	139.52	2° 34'	3° 05'	4° 07'	5° 08'	102.29
44°	133.47	2° 41'	3° 13'	4° 18'	5° 22'	102.53
46°	127.97	2° 48'	3° 21'	4° 29'	5° 36'	102.76
48°	122.92	2° 55'	3° 29'	4° 40'	5° 50'	103.00
50°	118.31	3° 02'	3° 38'	4° 51'	6° 04'	103.24
52°	114.06	3° 09'	3° 46'	5° 02'	6° 17'	103.54
54°	110.11	3° 16'	3° 54'	5° 13'	6° 31'	103.84
56°	106.50	3° 22'	4° 02'	5° 23'	6° 44'	104.14
58°	103.14	3° 29'	4° 10'	5° 34'	6° 57'	104.43
60°	100.00	3° 35'	4° 18'	5° 44'	7° 11'	104.72

$$T = R \tan \frac{1}{2} I$$

$$T = \frac{50 \tan \frac{1}{2} I}{\sin. D}$$

$$\sin. D = \frac{50}{R}$$

$$\sin. D = \frac{50 \tan \frac{1}{2} I}{T}$$

## CURVE FORMULAS

$$R = T \cot. \frac{1}{2} I$$

$$R = \frac{50}{\sin. D}$$

$$E = R \text{ ex. sec } \frac{1}{2} I$$

$$E = T \tan \frac{1}{4} I$$

$$\text{Chord def.} = \frac{\text{chord}^2}{R}$$

$$\text{No. chords} = \frac{\frac{1}{2} I}{D}$$

$$\text{Tan. def.} = \frac{1}{2} \text{ chord def.}$$

The square of any distance, divided by twice the radius, will equal the distance from tangent to curve, very nearly.

Table IV. contains Tangents and Externals to a 1° curve. Tan. and Ext. to any other radius may be found nearly enough, by dividing the Tan. or Ext. opposite the given Central Angle by the given degree of curve.

To find Deg. of Curve, having the Central Angle and Tangent: Divide Tan. opposite the given Central Angle by the given Tangent.

To find Deg. of Curve, having the Central Angle and Tangent: Divide Ext. opposite the given Central Angle by the given External.

To find Nat. Tan. and Nat. Ex. Sec. for any angle by Table IV.: Tan. or Ext. of twice the given angle divided by the radius of a 1° curve will be the Nat. Tan. or Nat. Ex. Sec.

To find angle for a given distance and deflection.

Rule 1. Multiply the given distance by .01745 (def. for 1° for 1 ft.), and divide given deflection by the product.

Rule 2. Multiply given deflection by 57.3, and divide the product by the given distance.

To find deflection for a given angle and distance. Multiply the angle by .01745, and the product by the distance.

RIGHT ANGLE TRIANGLES. Square the altitude, divide by twice the base. Add quotient to base for hypotenuse.

Given Base 100, Alt. 10  $10^2 \div 200 = .5$ .  $100 + .5 = 100.5$  hyp.

Given Hyp. 100, Alt. 25  $25^2 \div 200 = 3.125$ .  $100 - 3.125 = 96.875 = \text{Base}$ .

Error in first example, .002; in last, .045.

To find Tons of Rail in one mile of track: multiply weight per yard by 11, and divide by 7.

## Natural Sines

Deg.	0'	10'	20'	30'	40'	50'	dg.	dg.	0'	10'	20'	30'	40'	50'	Deg.
0	0000	0029	0058	0087	0116	0145	89	40	6428	6450	6472	6494	6517	6539	49
1	0175	0204	0233	0262	0291	0320	88	41	6561	6583	6604	6626	6648	6670	48
2	0349	0378	0407	0436	0465	0494	87	42	6691	6713	6734	6756	6777	6799	47
3	0523	0552	0581	0610	0640	0669	86	43	6820	6841	6862	6884	6905	6926	46
4	0698	0727	0756	0785	0814	0843	85	44	6947	6967	6988	7009	7030	7050	45
5	0872	0901	0929	0958	0987	1016	84	45	7071	7092	7112	7133	7153	7173	44
6	1045	1074	1103	1132	1161	1190	83	46	7193	7214	7234	7254	7274	7294	43
7	1219	1248	1279	1305	1334	1363	82	47	7314	7333	7353	7373	7392	7412	42
8	1392	1421	1449	1478	1507	1536	81	48	7431	7451	7470	7490	7509	7528	41
9	1564	1593	1622	1650	1679	1708	80	49	7547	7566	7585	7604	7623	7642	40
10	1736	1765	1794	1822	1851	1880	79	50	7660	7679	7698	7716	7735	7753	39
11	1908	1937	1965	1994	2022	2051	78	51	7771	7790	7808	7826	7844	7862	38
12	2079	2108	2136	2164	2193	2221	77	52	7880	7898	7916	7934	7951	7969	37
13	2250	2278	2306	2334	2363	2391	76	53	7986	8004	8021	8039	8056	8073	36
14	2419	2447	2476	2504	2532	2560	75	54	8090	8107	8124	8141	8158	8175	35
15	2588	2616	2644	2672	2700	2728	74	55	8192	8208	8225	8241	8258	8274	34
16	2756	2784	2812	2840	2868	2896	73	56	8290	8307	8323	8339	8355	8371	33
17	2924	2952	2979	3007	3035	3062	72	57	8387	8403	8418	8434	8450	8465	32
18	3090	3118	3145	3173	3201	3228	71	58	8480	8496	8511	8526	8542	8557	31
19	3256	3283	3311	3338	3365	3393	70	59	8572	8587	8601	8616	8631	8646	30
20	3420	3448	3475	3502	3529	3557	69	60	8660	8675	8689	8704	8718	8732	29
21	3584	3611	3638	3665	3692	3719	68	61	8746	8760	8774	8788	8802	8816	28
22	3746	3773	3800	3827	3854	3881	67	62	8829	8843	8857	8870	8884	8897	27
23	3907	3934	3961	3987	4014	4041	66	63	8910	8923	8936	8949	8962	8975	26
24	4067	4094	4120	4147	4173	4200	65	64	8988	9001	9013	9026	9038	9051	25
25	4226	4253	4279	4305	4331	4358	64	65	9063	9075	9088	9100	9112	9124	24
26	4384	4410	4436	4462	4488	4514	63	66	9135	9147	9159	9171	9182	9194	23
27	4540	4566	4592	4617	4643	4669	62	67	9205	9216	9228	9239	9250	9261	22
28	4695	4720	4746	4772	4797	4823	61	68	9272	9283	9293	9304	9315	9325	21
29	4848	4874	4899	4924	4950	4975	60	69	9336	9346	9356	9367	9377	9387	20
30	5000	5025	5050	5075	5100	5125	59	70	9397	9407	9417	9426	9436	9446	19
31	5150	5175	5200	5225	5250	5275	58	71	9455	9465	9474	9483	9492	9502	18
32	5299	5324	5348	5373	5398	5422	57	72	9511	9520	9528	9537	9546	9555	17
33	5446	5471	5495	5519	5544	5568	56	73	9563	9572	9580	9588	9596	9605	16
34	5592	5616	5640	5664	5688	5712	55	74	9613	9621	9628	9636	9644	9652	15
35	5736	5760	5783	5807	5831	5854	54	75	9659	9667	9674	9681	9689	9696	14
36	5878	5901	5925	5948	5972	5995	53	76	9703	9710	9717	9724	9730	9737	13
37	6018	6041	6065	6088	6111	6134	52	77	9744	9750	9757	9763	9769	9775	12
38	6157	6180	6202	6225	6248	6271	51	78	9781	9787	9793	9799	9805	9811	11
39	6293	6316	6338	6361	6383	6406	50	79	9816	9822	9827	9833	9838	9843	10
Deg.	60'	50'	40'	30'	20'	10'	dg.	dg.	60'	50'	40'	30'	20'	10'	Deg.

Deg.	0'	10'	20'	30'	40'	50'	Deg.
80	9848	9853	9858	9863	9868	9872	9
81	9877	9881	9886	9890	9894	9899	8
82	9903	9907	9911	9914	9918	9922	7
83	9925	9929	9932	9936	9939	9942	6
84	9945	9948	9951	9954	9957	9959	5
85	9962	9964	9967	9969	9971	9974	4
86	9976	9978	9980	9981	9983	9985	3
87	9986	9988	9989	9990	9992	9993	2
88	9994	9995	9996	9997	9997	9998	1
89	9998	9999	9999	9999	1.0000	1.0000	0
Deg.	60'	50'	40'	30'	20'	10'	Deg.

## Natural Cosines

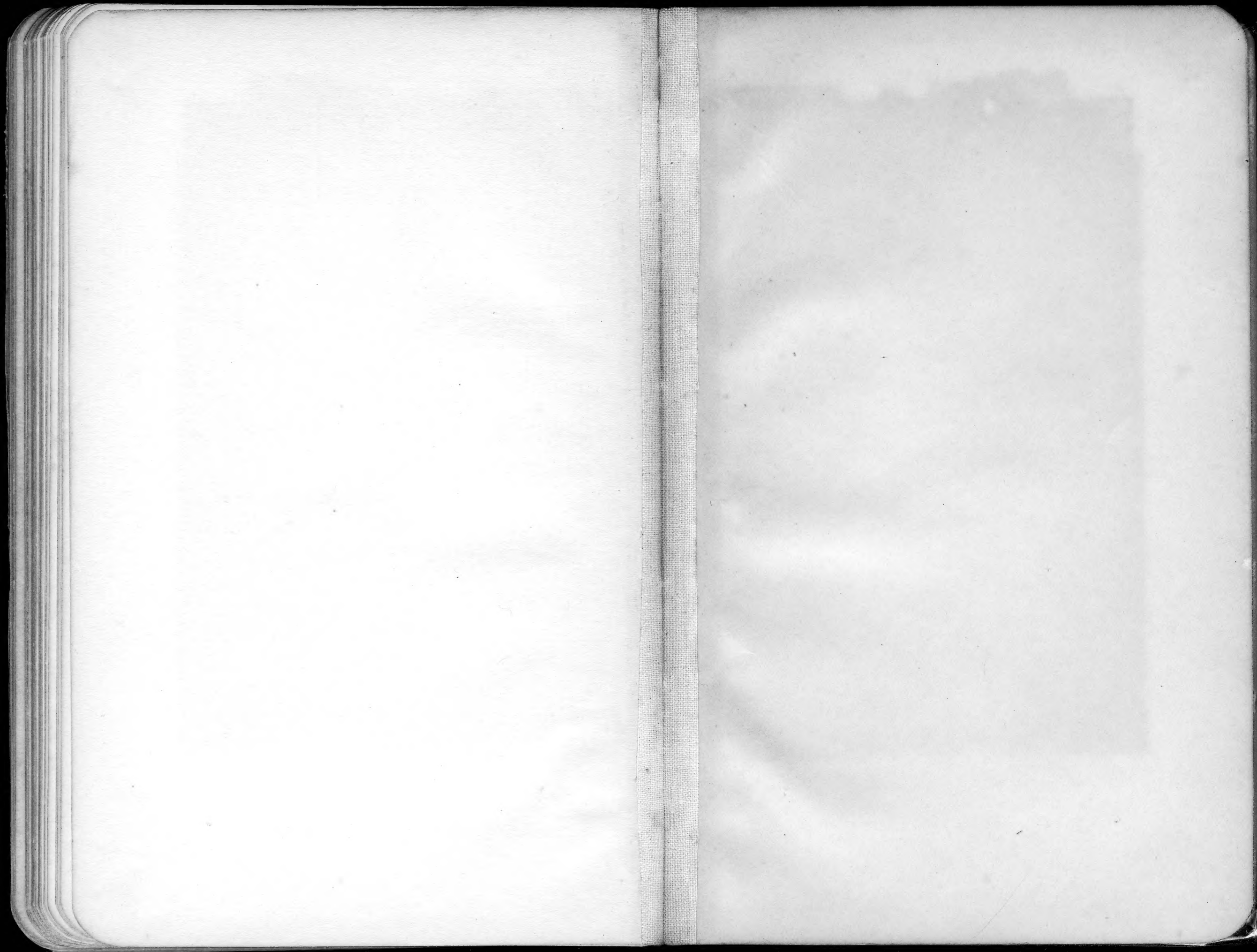


## Natural Tangents.

Deg.	0'	10'	20'	30'	40'	50'	Deg.	Deg.	0'	10'	20'	30'	40'	50'	Deg.
0	0000	0029	0058	0087	0116	0145	89	40	8391	8441	8491	8541	8591	8642	49
1	0175	0204	0233	0262	0291	0320	88	41	8693	8744	8796	8847	8899	8952	48
2	0349	0378	0407	0437	0466	0495	87	42	9004	9057	9110	9163	9217	9271	47
3	0524	0553	0582	0612	0641	0670	86	43	9325	9380	9435	9490	9545	9601	46
4	0699	0729	0758	0787	0816	0846	85	44	9657	9713	9770	9827	9884	9942	45
5	0875	0904	0934	0963	0992	1022	84	45	1.0000	1.0058	1.0117	1.0176	1.0235	1.0295	44
6	1051	1080	1110	1139	1169	1198	83	46	1.0355	1.0416	1.0477	1.0533	1.0599	1.0661	43
7	1228	1257	1287	1317	1346	1376	82	47	1.0724	1.0786	1.0850	1.0913	1.0977	1.1041	42
8	1405	1435	1465	1495	1524	1554	81	48	1.1106	1.1171	1.1237	1.1303	1.1369	1.1436	41
9	1584	1614	1644	1673	1703	1733	80	49	1.1504	1.1571	1.1640	1.1708	1.1778	1.1847	40
10	1763	1793	1823	1853	1883	1914	79	50	1.1918	1.1988	1.2059	1.2131	1.2203	1.2276	39
11	1944	1974	2004	2035	2065	2095	78	51	1.2349	1.2423	1.2497	1.2572	1.2647	1.2723	38
12	2126	2156	2186	2217	2247	2278	77	52	1.2799	1.2876	1.2954	1.3032	1.3111	1.3190	37
13	2309	2339	2370	2401	2432	2462	76	53	1.3270	1.3351	1.3432	1.3514	1.3597	1.3680	36
14	2493	2524	2555	2586	2617	2648	75	54	1.3764	1.3848	1.3934	1.4019	1.4106	1.4193	35
15	2679	2711	2742	2773	2805	2836	74	55	1.4281	1.4370	1.4460	1.4550	1.4641	1.4733	34
16	2867	2899	2931	2962	2994	3026	73	56	1.4826	1.4919	1.5013	1.5108	1.5204	1.5301	33
17	3057	3089	3121	3153	3185	3217	72	57	1.5399	1.5497	1.5597	1.5697	1.5798	1.5900	32
18	3249	3281	3314	3346	3378	3411	71	58	1.6003	1.6107	1.6212	1.6319	1.6426	1.6534	31
19	3443	3476	3508	3541	3574	3607	70	59	1.6643	1.6753	1.6864	1.6977	1.7090	1.7205	30
20	3640	3673	3706	3739	3772	3805	69	60	1.7321	1.7437	1.7556	1.7675	1.7797	1.7917	29
21	3839	3872	3906	3939	3973	4006	68	61	1.8040	1.8165	1.8291	1.8418	1.8546	1.8676	28
22	4040	4074	4108	4142	4176	4210	67	62	1.8807	1.8940	1.9074	1.9210	1.9347	1.9486	27
23	4245	4279	4314	4348	4383	4417	66	63	1.9626	1.9768	1.9912	2.0057	2.0204	2.0353	26
24	4452	4487	4522	4557	4592	4628	65	64	2.0503	2.0655	2.0809	2.0965	2.1123	2.1283	25
25	4663	4699	4734	4770	4806	4841	64	65	2.1445	2.1609	2.1775	2.1943	2.2113	2.2286	24
26	4877	4913	4950	4986	5022	5059	63	66	2.2460	2.2637	2.2817	2.2998	2.3183	2.3369	23
27	5095	5132	5169	5206	5243	5280	62	67	2.3559	2.3750	2.3945	2.4142	2.4342	2.4545	22
28	5317	5354	5392	5430	5467	5505	61	68	2.4751	2.4960	2.5172	2.5386	2.5605	2.5826	21
29	5543	5581	5619	5658	5696	5735	60	69	2.6051	2.6279	2.6511	2.6746	2.6985	2.7228	20
30	5774	5812	5851	5890	5930	5969	59	70	2.7475	2.7725	2.7980	2.8239	2.8502	2.8770	19
31	6009	6048	6088	6128	6168	6208	58	71	2.9042	2.9319	2.9600	2.9887	3.0178	3.0475	18
32	6249	6289	6330	6371	6412	6453	57	72	3.0777	3.1084	3.1397	3.1716	3.2041	3.2371	17
33	6494	6536	6577	6619	6661	6703	56	73	3.2709	3.3052	3.3402	3.3759	3.4124	3.4495	16
34	6745	6787	6830	6873	6916	6959	55	74	3.4874	3.5261	3.5656	3.6059	3.6470	3.6891	15
35	7002	7046	7089	7133	7177	7221	54	75	3.7321	3.7760	3.8208	3.8657	3.9136	3.9617	14
36	7265	7310	7355	7400	7445	7490	53	76	4.0108	4.0611	4.1126	4.1653	4.2193	4.2747	13
37	7536	7581	7627	7673	7720	7766	52	77	4.3315	4.3897	4.4494	4.5107	4.5736	4.6382	12
38	7813	7860	7907	7954	8002	8050	51	78	4.7046	4.7729	4.8430	4.9152	4.9894	5.0658	11
39	8098	8146	8195	8243	8292	8342	50	79	5.1446	5.2257	5.3093	5.3955	5.4845	5.5764	10
Deg.	60'	50'	40'	30'	20'	10'	Deg.	Deg.	60'	50'	40'	30'	20'	10'	Deg.

Deg.	0'	10'	20'	30'	40'	50'	Deg.
80	5.6713	5.7694	5.8708	5.9758	6.0844	6.1970	9
81	6.3138	6.4348	6.5606	6.6912	6.8269	6.9682	8
82	7.1154	7.2687	7.4287	7.5958	7.7704	7.9530	7
83	8.1443	8.3450	8.5555	8.7769	9.0098	9.2553	6
84	9.5144	9.7882	10.078	10.385	10.711	11.059	5
85	11.430	11.826	12.250	12.706	13.197	13.727	4
86	14.300	14.924	15.605	16.350	17.169	18.075	3
87	19.081	20.206	21.470	22.903	24.542	26.432	2
88	28.636	31.242	34.368	38.189	42.964	49.104	1
89	57.290	68.750	85.940	114.588	171.885	343.77	0
Deg.	60'	50'	40'	30'	20'	10'	Deg.

## Natural Cotangents.





# DISTANCES FROM CENTER OF ROADWAY FOR CROSS-SECTIONING.

ROADWAY 14 FEET WIDE. SIDE SLOPES 1½ TO 1.

FOR SINGLE TRACK EMBANKMENT.

	0	.1	.2	.3	.4	.5	.6	.7	.8	.9	
0	7.0	7.2	7.3	7.5	7.6	7.8	7.9	8.1	8.2	8.4	0
1	8.5	8.7	8.8	9.0	9.1	9.3	9.4	9.6	9.7	9.9	1
2	10.0	10.2	10.3	10.5	10.6	10.8	10.9	11.1	11.2	11.4	2
3	11.5	11.7	11.8	12.0	12.1	12.3	12.4	12.6	12.7	12.9	3
4	13.0	13.2	13.3	13.5	13.6	13.8	13.9	14.1	14.2	14.4	4
5	14.5	14.7	14.8	15.0	15.1	15.3	15.4	15.6	15.7	15.9	5
6	16.0	16.2	16.3	16.5	16.6	16.8	16.9	17.1	17.2	17.4	6
7	17.5	17.7	17.8	18.0	18.1	18.3	18.4	18.6	18.7	18.9	7
8	19.0	19.2	19.3	19.5	19.6	19.8	19.9	20.1	20.2	20.4	8
9	20.5	20.7	20.8	21.0	21.1	21.3	21.4	21.6	21.7	21.9	9
10	22.0	22.2	22.3	22.5	22.6	22.8	22.9	23.1	23.2	23.4	10
11	23.5	23.7	23.8	24.0	24.1	24.3	24.4	24.6	24.7	24.9	11
12	25.0	25.2	25.3	25.5	25.6	25.8	25.9	26.1	26.2	26.4	12
13	26.5	26.7	26.8	27.0	27.1	27.3	27.4	27.6	27.7	27.9	13
14	28.0	28.2	28.3	28.5	28.6	28.8	28.9	29.1	29.2	29.4	14
15	29.5	29.7	29.8	30.0	30.1	30.3	30.4	30.6	30.7	30.9	15
16	31.0	31.2	31.3	31.5	31.6	31.8	31.9	32.1	32.2	32.4	16
17	32.5	32.7	32.8	33.0	33.1	33.3	33.4	33.6	33.7	33.9	17
18	34.0	34.2	34.3	34.5	34.6	34.8	34.9	35.1	35.2	35.4	18
19	35.5	35.7	35.8	36.0	36.1	36.3	36.4	36.6	36.7	36.9	19
20	37.0	37.2	37.3	37.5	37.6	37.8	37.9	38.1	38.2	38.4	20
21	38.5	38.7	38.8	39.0	39.1	39.3	39.4	39.6	39.7	39.9	21
22	40.0	40.2	40.3	40.5	40.6	40.8	40.9	41.1	41.2	41.4	22
23	41.5	41.7	41.8	42.0	42.1	42.3	42.4	42.6	42.7	42.9	23
24	43.0	43.2	43.3	43.5	43.6	43.8	43.9	44.1	44.2	44.4	24
25	44.5	44.7	44.8	45.0	45.1	45.3	45.4	45.6	45.7	45.9	25
26	46.0	46.2	46.3	46.5	46.6	46.8	46.9	47.1	47.2	47.4	26
27	47.5	47.7	47.8	48.0	48.1	48.3	48.4	48.6	48.7	48.9	27
28	49.0	49.2	49.3	49.5	49.6	49.8	49.9	50.1	50.2	50.4	28
29	50.5	50.7	50.8	51.0	51.1	51.3	51.4	51.6	51.7	51.9	29
30	52.0	52.2	52.3	52.5	52.6	52.8	52.9	53.1	53.2	53.4	30
31	53.5	53.7	53.8	54.0	54.1	54.3	54.4	54.6	54.7	54.9	31
32	55.0	55.2	55.3	55.5	55.6	55.8	55.9	56.1	56.2	56.4	32
33	56.5	56.7	56.8	57.0	57.1	57.3	57.4	57.6	57.7	57.9	33
34	58.0	58.2	58.3	58.5	58.6	58.8	58.9	59.1	59.2	59.4	34
35	59.5	59.7	59.8	60.0	60.1	60.3	60.4	60.6	60.7	60.9	35
36	61.0	61.2	61.3	61.5	61.6	61.8	61.9	62.1	62.2	62.4	36

Calculated by Julien A. Hall, M. Am. Soc. C. E.

